ORDER NO. SD83072611C2

Service Manual

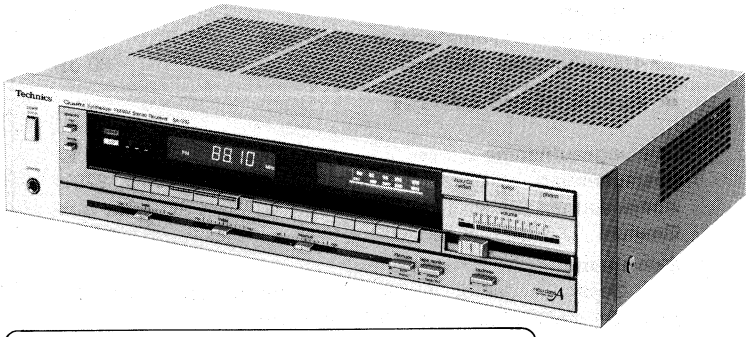
QUARTZ Synthesizer FM/AM Stereo Receiver

SA-310

[EGA]

SA-310(K)

[EGA]



* The colors of this model included silver and black.
* The black type model is provided with (K) in the Service Manual.

Area

* [EGA] is available in F.R. Germany.

TECHNISCHE DATEN (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

DIN-Ausgangsleistung	2 × 54W (4 Ω) 2 × 42W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 48W (4 Ω) 2 × 37W (8 Ω)
Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz	
beide Kanäle ausgesteuert	2 × 40W (4 Ω) 2 × 35W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 1 kHz	0,02% (4 Ω) 0,02% (8 Ω)
Nennleistung bei 20 Hz ~ 20 kHz	0,04% (4 Ω) 0,02% (8 Ω)
halbe Nennleistung bei 1 kHz	0,005% (8 Ω)
Intermodulationsfaktor	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,04%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,02%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei −3 dB	5 Hz ~ 40 kHz (4 Ω)
Dämpfungsfaktor	20 (4 Ω), 40 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
AUX/CD/VIDEO	150 mV/22 kΩ
Tape	150 mV/22 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	160 mV
Frequenzgang	
Phono	RIAA-Standardkurve ±0,8 dB (30 Hz ~ 15 kHz)
AUX/CD/VIDEO, TAPE	5 Hz ~ 70 kHz (−3 dB)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ −10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ −10 dB
Geräuschabstand	
Nennleistung (4 Ω)	
Phono	75 dB (nach IHF, A: 80 dB)
AUX/CD/VIDEO, TAPE	88 dB (nach IHF, A: 95 dB)
−26 dB Leistung (4 Ω)	
Phono	64 dB
AUX/CD/VIDEO, TAPE	66 dB
50 mW Leistung (4 Ω)	
Phono	62 dB
AUX/CD/VIDEO, TAPE	62 dB
Gehörrichtige Lautstärkekorrektur (Loudness)	
(bei −30 dB Ausgangsleistung)	50 Hz, +9 dB
Ausgangsspannung und -impedanz	
Tape, Aufnahme (TAPE, REC OUT)	150 mV
Kanalabweichung (AUX/CD/VIDEO,	
TAPE, 250 Hz ~ 6300 Hz)	±1 dB
Übersprechdämpfung (AUX/CD/VIDEO, TAPE 1 kHz)	55 dB
Kopfhörerpegel und -impedanz	430 mV/330 Ω
Lautsprecherimpedanz	
MAIN oder REMOTE	4 Ω ~ 16 Ω
MAIN und REMOTE	8 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
Eingangsempfindlichkeit	
S/R 30 dB	1,3 μV (75 Ω)
S/R 26 dB	1,2 μV (75 Ω)
S/R 20 dB	0,9 μV (75 Ω)
Nutzempfindlichkeit nach IHF	1,5 μV (nach IHF '58)
Gesamtklirrfaktor	
Mono	0,08%
Stereo	0,15%

Technics

Matsushita Electric Trading Co., Ltd
P.O. Box 288, Central Osaka

Geräuschabstand	
Mono	60 dB (78 dB nach IHF)
Stereo	58 dB (72 dB nach IHF)
Frequenzgang	20 Hz ~ 15 kHz (+1 dB ~ −2 dB)
Trennschärfe bei Störsender	+400 kHz, 75 dB
Einfangverhältnis	1 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	75 dB
ZF-Dämpfung bei 98 MHz	100 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	100 dB
MW-Unterdrückung	55 dB
Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	−60 dB (−65 dB nach IHF)
38 kHz	−70 dB (−75 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,5 dB
Begrenzereinsatz	
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	75 Ω (unsymmetrisch)

■ MW-TUNERTEIL

Wellenbereiche	522 ~ 1611 kHz
Eingangsempfindlichkeit (S/R 20 dB)	20 μV, 300 μV/m
Trennschärfe	55 dB
Spiegelfrequenz-Dämpfung bei 1000 kHz	40 dB
ZF-Dämpfung bei 1000 kHz	60 dB

■ ALLGEMEINE DATEN

Leistungsaufnahme	360 W
Netzspannung	Wechselstrom 50 Hz/60 Hz, 220V
Abmessungen (B×H×T)	430 × 97 × 283 mm
Gewicht	6,7 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

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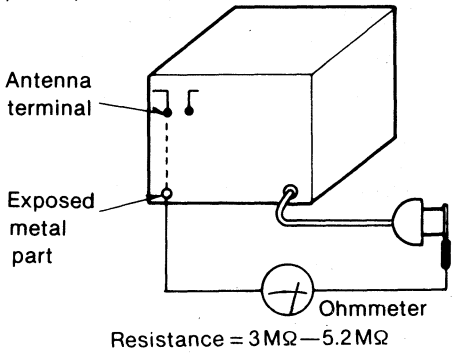
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

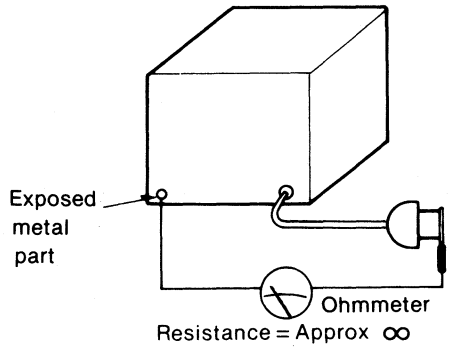
• INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



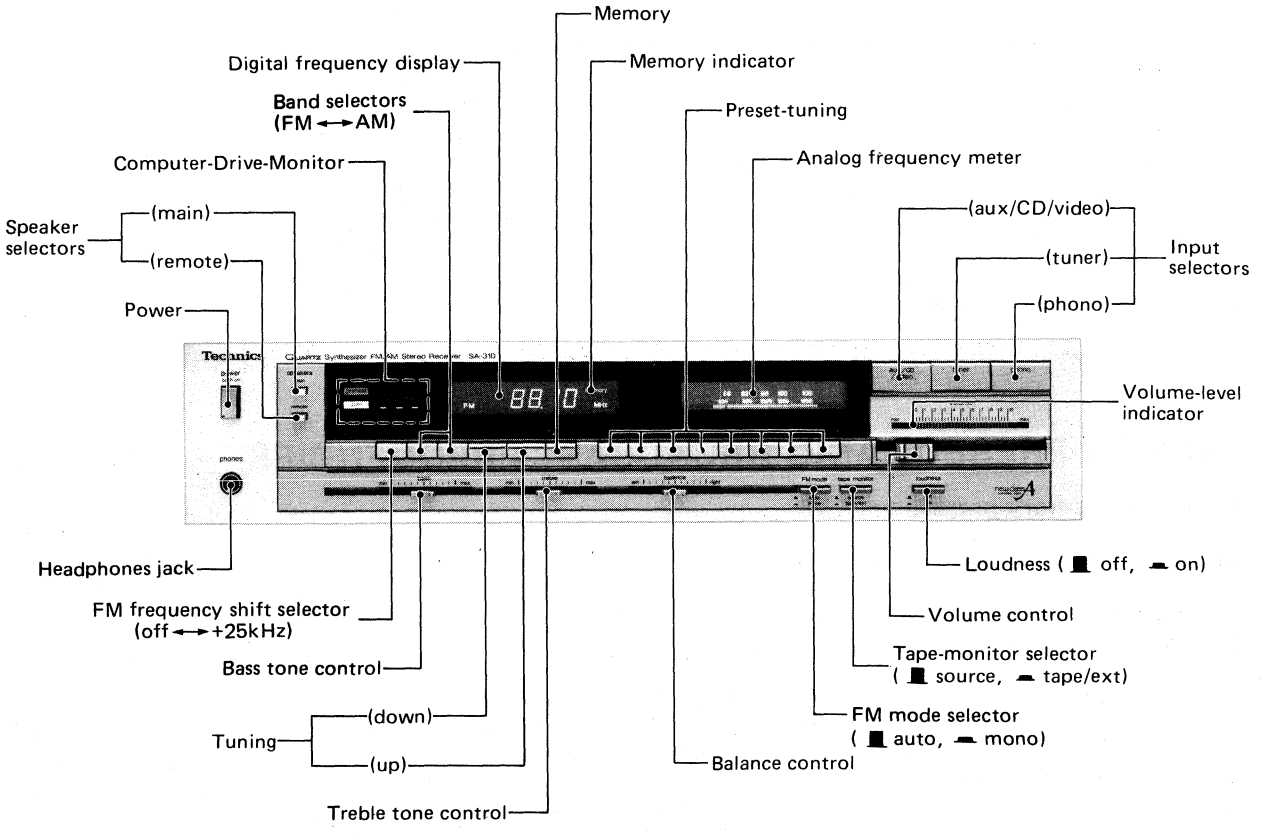
Resistance = 3MΩ—5.2MΩ
(Fig. A)

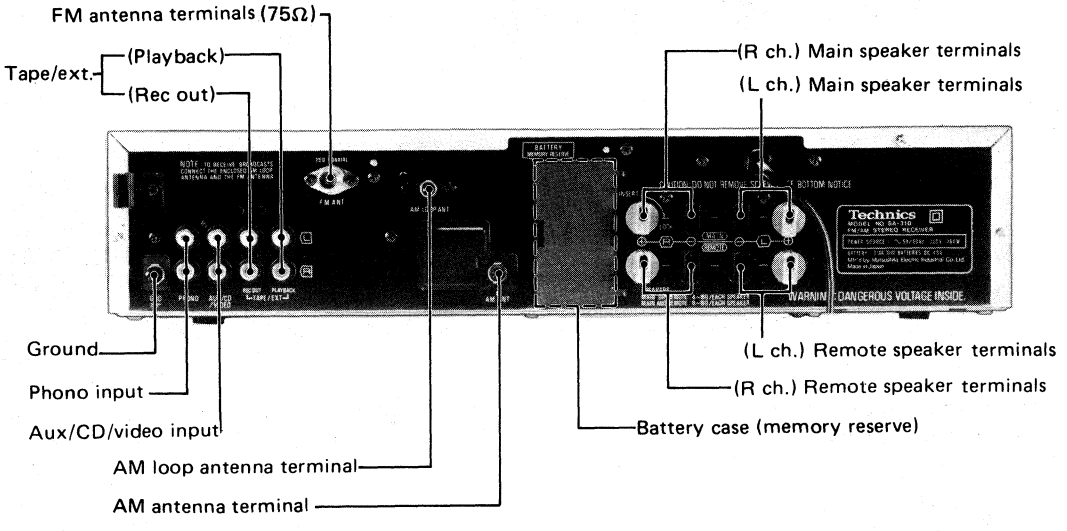


Resistance = Approx ∞
(Fig. B)

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS

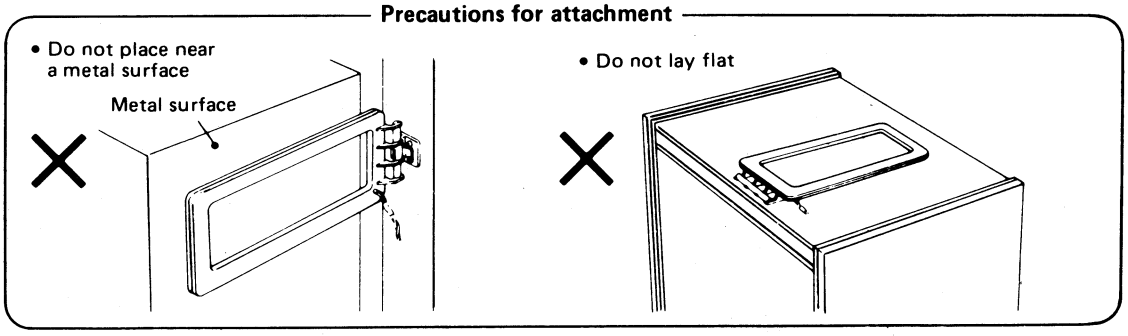




- Phono input capacitance is about 150pF.

■ AM LOOP ANTENNA

When the AM loop antenna is connected to the rear panel, place it as far away from the set as possible to improve the sensitivity.



■ HOW TO PRESET RADIO BROADCAST FREQUENCIES

- **Automatic memory presetting**

3 **Power: "on" (▲—▲)**

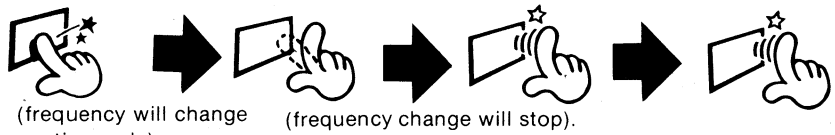
4 **•To preset an FM station: press the "FM" button.**
•To preset an AM station: press the "AM" button.

5 **• To preset FM broadcasting stations: Set to 87.50 MHz.**
• To preset AM broadcasting stations: Set to 522 kHz.

① Press the button and hold slightly

② Release it at 87.50 MHz for FM or 522 kHz for AM, and then press the button again momentarily

③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.

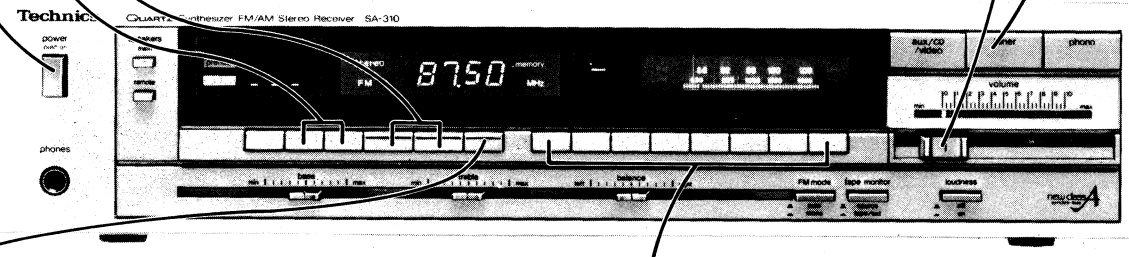


(frequency will change continuously).

(frequency change will stop).

1 **"0 — 1"**
Set volume control to low position for easier tuning.

2 **"tuner"**



6 **Press. When the frequency indication begins to change, release.**

(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

7 Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel.

To check the front channels (1~8):

Press momentarily. → Channel number is displayed. → Frequency stored in the memory is displayed.

To check the back channels (9~16):

Press slightly longer. → Release the button when the channel number is displayed. → Frequency stored in the memory is displayed.

Notes:

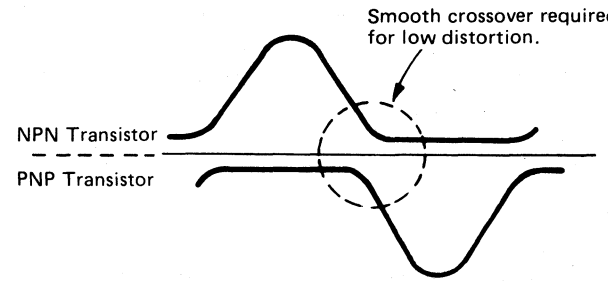
1. In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

■ TECHNICAL INFORMATION

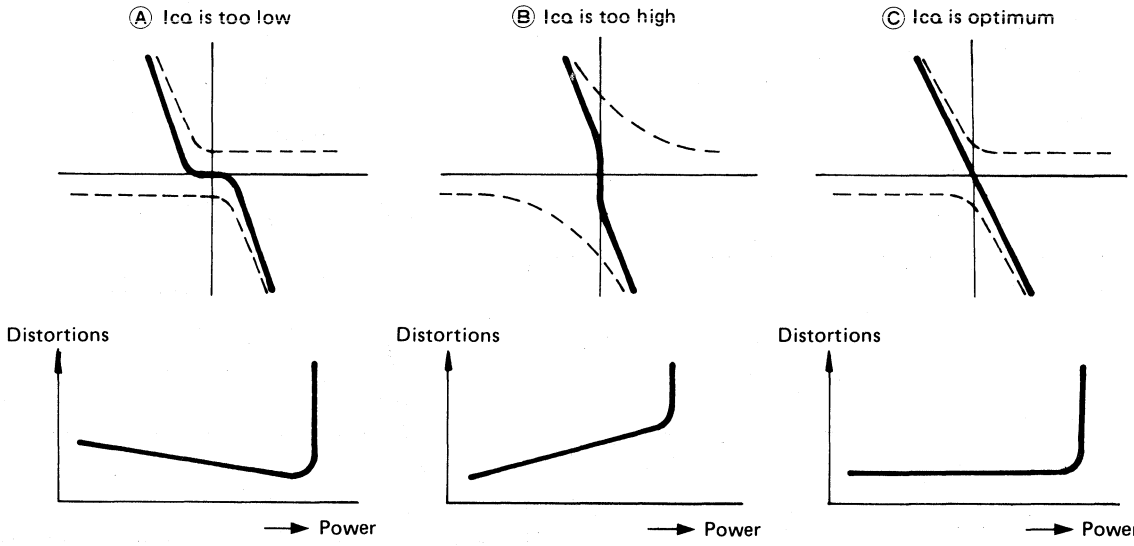
Technics New Class A amplifier circuitry eliminates switching and crossover distortion. To further improve fidelity a "computer drive" circuit has been incorporated to eliminate transient distortion in music signal reproduction.

• Power transistor idling current (Icq)

The idling current through the power transistors is adjusted so that crossover distortion is minimized when switching from the NPN transistor to the PNP transistor in a complimentary design (Fig. 1).
If Icq is not adjusted properly, distortion will result as in Fig. 2.



[Fig. 1]

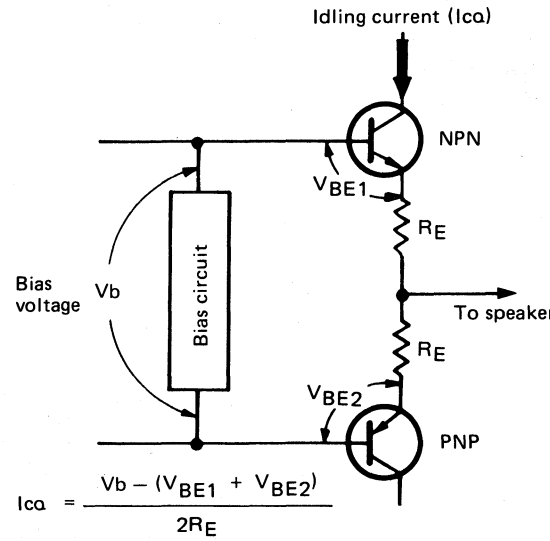


Relationship between idling current level and cross-over distortion.

[Fig. 2]

• Idling current and bias current

Idling current is determined by the bias voltage (Vb) of the bias circuit and the V_{BE} of each power transistor (Fig. 3). The V_{BE} varies according to the temperature of the transistor. This temperature varies instantaneously with the music signal. Unfortunately, with current designs, these instantaneous fluctuations cannot be detected due to the placement of the thermal sensor and the slow temperature change of the heat sink. Attempts have been made to include a thermal sensor as part of the output power pack. However, most power packs do not include a thermal sensor. Also, this method does not work if discrete components are used. We are still faced with the problem of stable bias operation and fast response to abrupt changes in temperature.

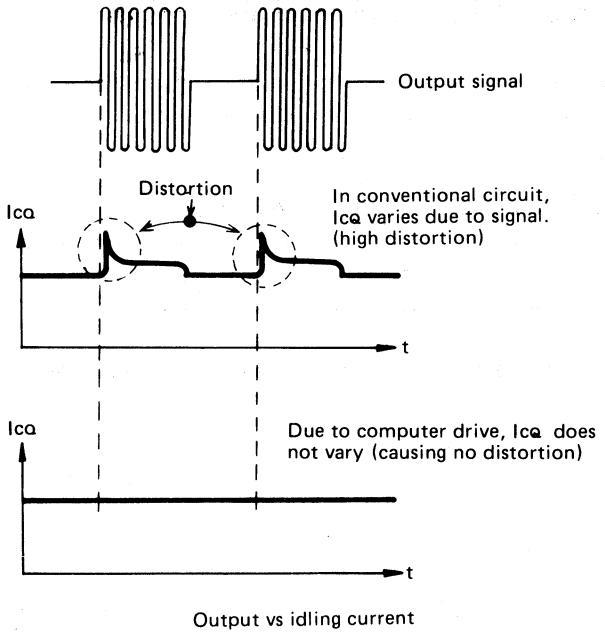


[Fig. 3]

• Computer drive system

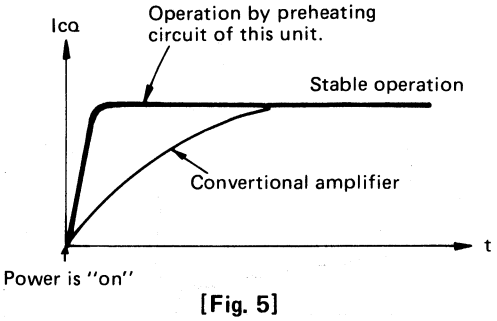
Knowing the thermal and signal characteristics of the power transistors, a system can be designed to calculater the instantaneous temperature changes and adjust for the optimum idling current. Information regarding th transistor ambient temperature and the input music signal is obtained through sensors and fed to a computer. Th computer calculates the optimum idle current and maintains it at a constant level by varying the bias voltage. Figure 4 illustrates the relationship of the output signal and the idling current. Figure 6 is a block diagram of the "computer drive" system.

Generally, it takes several minutes for the power transistors to reach the temperature of stable operation after the power is turned on. To ensure stable and optimum performance quickly, the microcomputer forces a large amount of idling current through the power transistors for a short time. This rapidly "preheats" the transistors and the heat sink. Figure 6 illustrates the stable operation level for the convertional and new computer drive system.

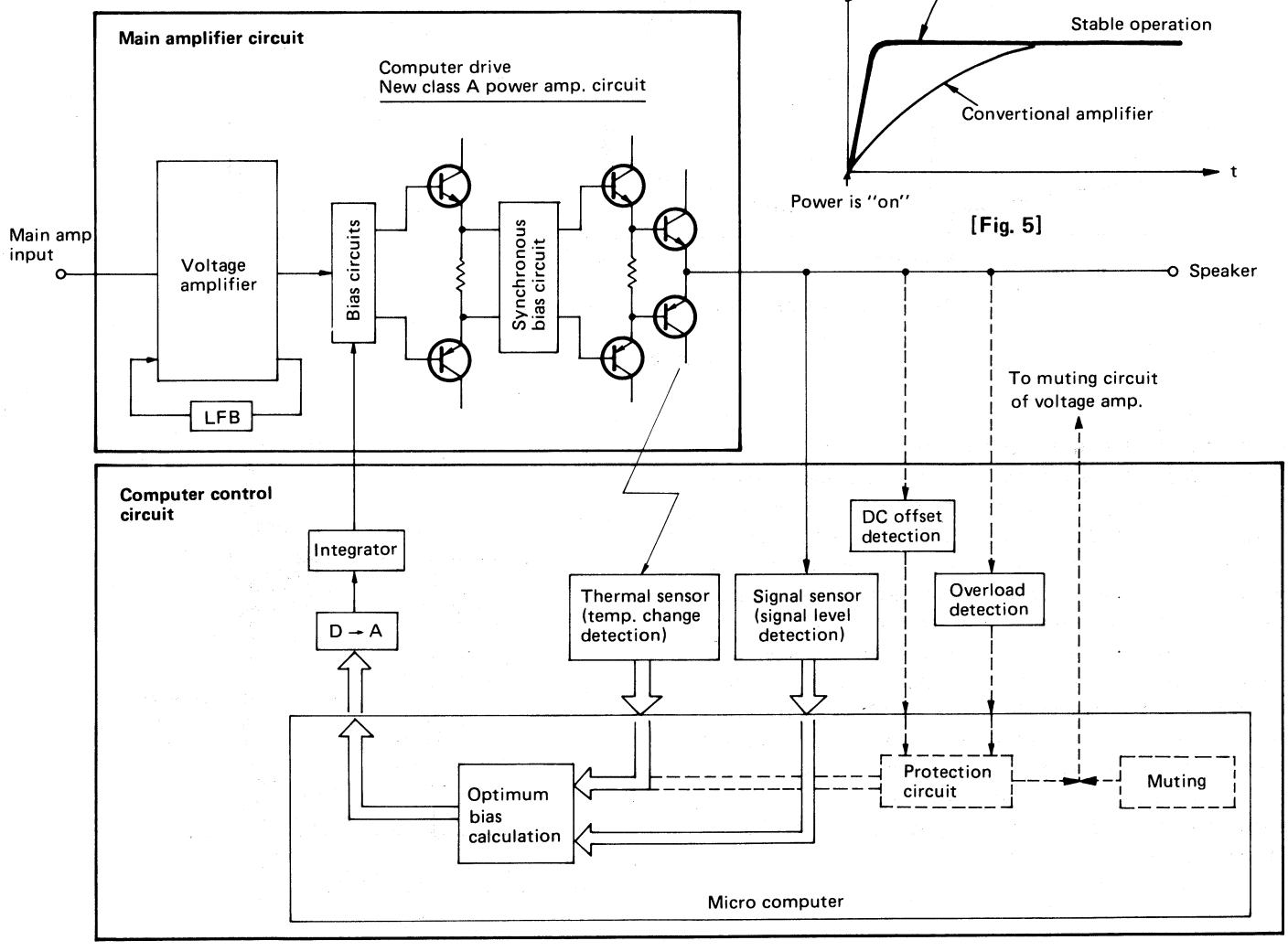


Output vs idling current

[Fig. 4]



[Fig. 5]



[Fig. 6]

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

Note

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ BEFORE REPAIR AND ADJUSTMENT

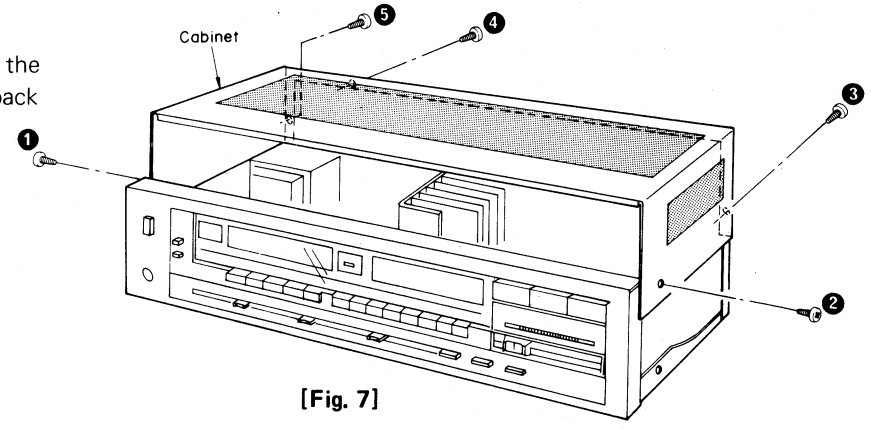
1. Turn off the power supply and short-circuit of power supply capacitors (C703, C704, 6800μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C703 and C704 by screwdriver. It may damage the componet.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnrormality. The consumed current at 60Hz/50Hz in no signal mode is shown below with respect to supply voltage 220V.

Power supply voltage		AC 220V
Consumed current	50 Hz	140 ~ 520mA
	60 Hz	120 ~ 500mA

■ DISASSEMBLY INSTRUCTIONS

• How to remove the cabinet [Fig. 7]

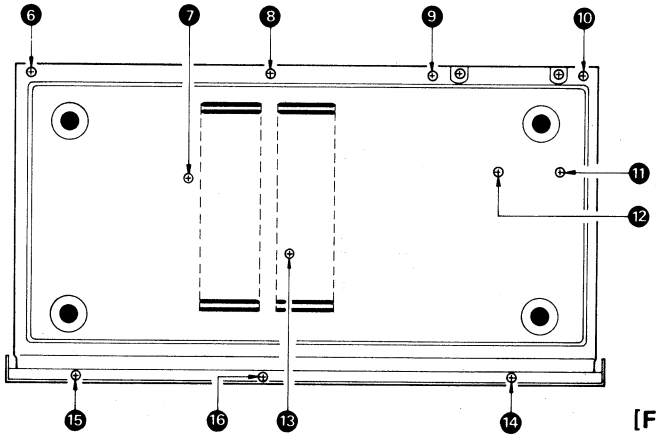
1. Remove the 2 setscrews (Fig. 7 : ❶, ❷) on the side and 3 setscrews (Fig. 7 : ❸~❺) on the back of the cabinet.
2. Remove the cabinet upward.



[Fig. 7]

• How to remove the bottom board [Fig. 8]

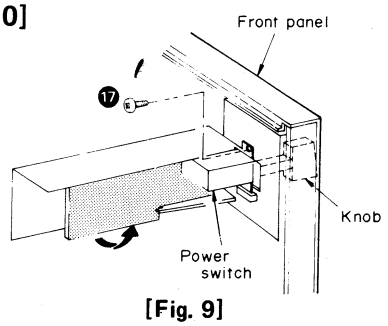
1. Remove the 10 setscrews (Fig. 8 : ❻ ~ ⓯) of the bottom board.
2. Remove the bottom board.



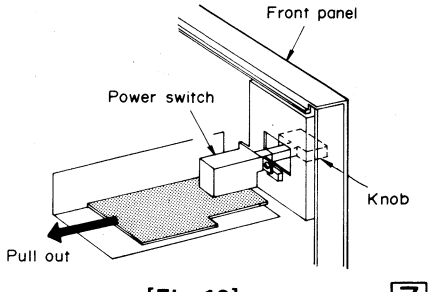
[Fig. 8]

• How to remove the power switch [Fig. 9, 10]

1. Remove the setscrew (Fig. 9 : ⓱) of the power switch.
2. Next, lay down the power switch P.C.B. as shown in Fig. 10, and remove the power switch from the front panel.



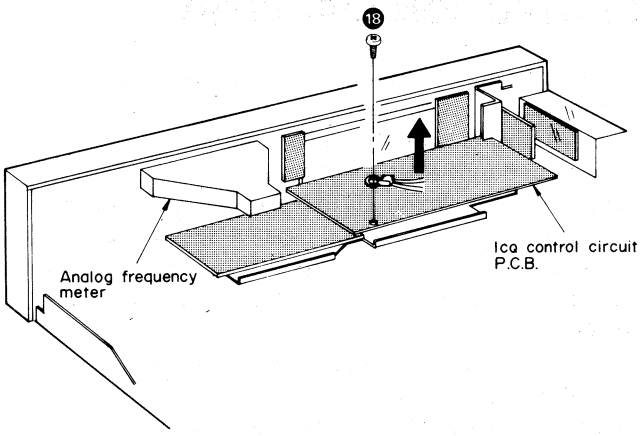
[Fig. 9]



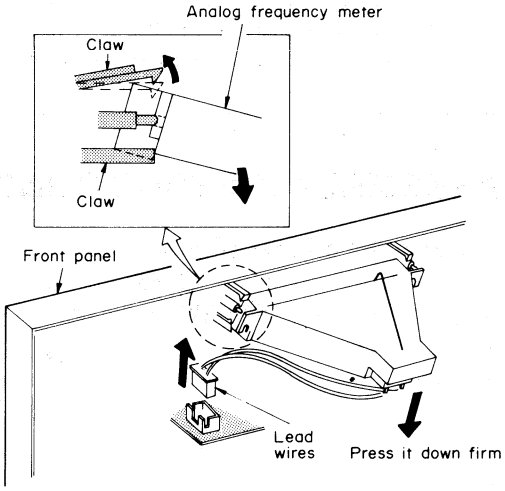
[Fig. 10]

• How to remove the front panel [Fig. 11 ~ 18]

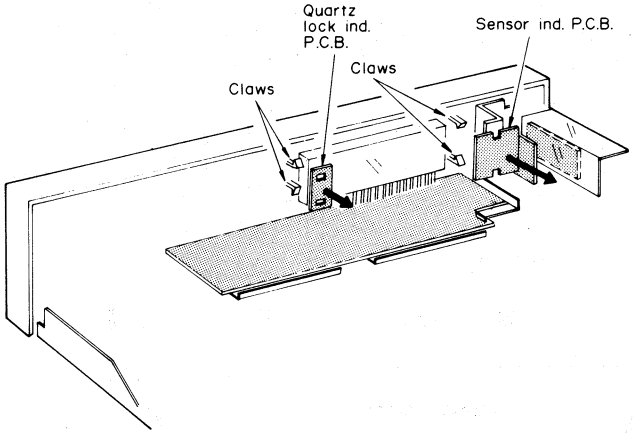
1. Remove the cabinet.
2. Remove the setscrew (Fig. 11 : ⑱), and then remove the Ica control circuit P.C.B.
3. Disconnect the lead wire of analog frequency meter and press down the meter as shown in Fig. 12 to remove it from the front panel assembly.
4. Release the 2 claws which fasten the quartz lock indicator P.C.B. and sensor indicator P.C.B., and then remove the printed circuit board from the front panel. (See Fig. 13)
5. Remove the setscrew (Fig. 14 : ⑲) of the FM/AM preset-tuning P.C.B. and then detach the FM/AM preset-tuning P.C.B.
6. Remove the 2 setscrews (Fig. 15 : ⑳ , ㉑) of the shield plate, and then detach the shield plate.
7. Remove the 3 input selector knobs by pushing them from inside the front panel by use of a screwdriver or the like. (Refer to Fig. 16)
8. Remove the 3 setscrews (Fig.17 : ⑭ ~ ⑯) which secure the front panel from the bottom.
9. Next, pull out the front panel toward you as shown in Fig. 17.
10. Release the 5 claws at the top and the 4 claws at the down of the front panel grille and then remove the front panel aslant as in Fig. 18.



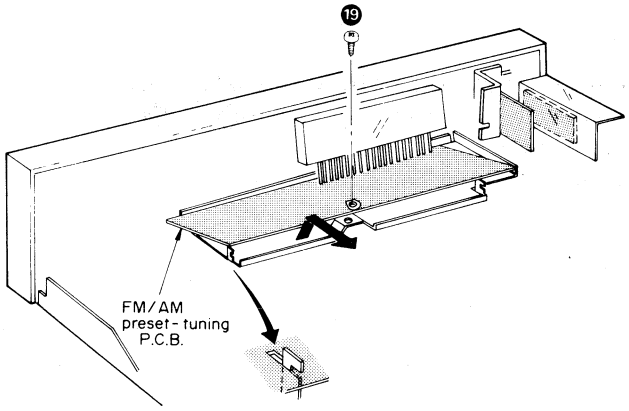
[Fig. 11]



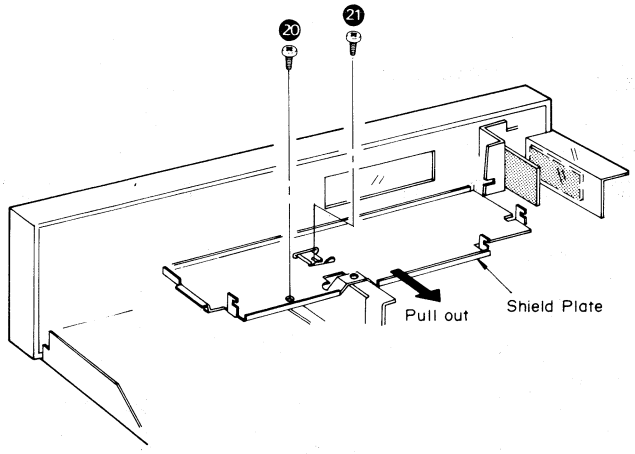
[Fig. 12]



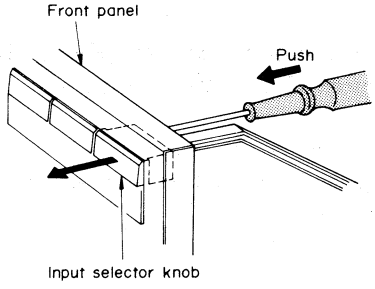
[Fig. 13]



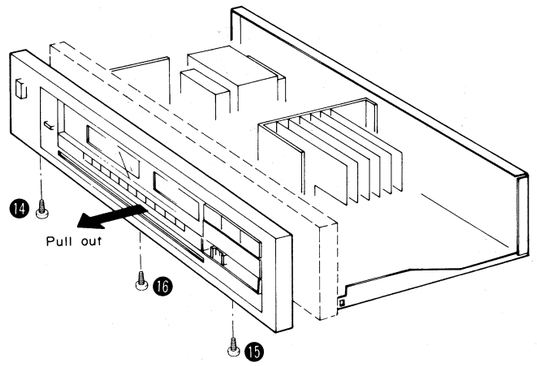
[Fig. 14]



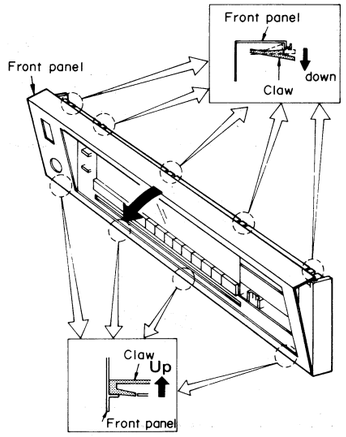
[Fig. 15]



[Fig. 16]



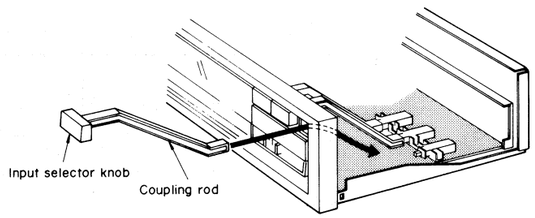
[Fig. 17]



[Fig. 18]

NOTE

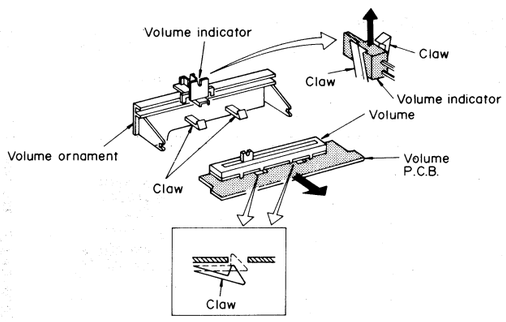
To set the input selector knob, fit the knob to the coupling rod as in Fig. 19, and set it through the front panel before attaching it to the switch.



[Fig. 19]

- **How to remove the volume P.C.B. and volume indicator [Fig. 20]**

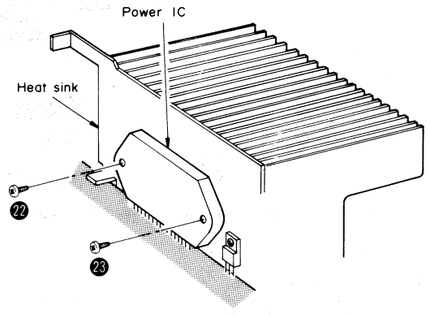
1. The volume P.C.B. is secured with the 2 claws projected from the volume ornament. So release the claws with a screwdriver, and pull out the volume P.C.B. as shown in Fig. 20.
2. When removing the volume indicator, release the 2 claws which secure the volume indicator, and then remove the indicator upward. In this case, do not bend the claws excessively.



[Fig. 20]

- **How to remove the power amplifier IC [Fig. 21]**

1. Remove the cabinet and bottom board.
2. Unsolder power IC.
3. Remove the 2 setscrews (Fig. 21 : 22 , 23) used to secure the power IC on the heat sink, and then pull the power IC.
4. When mounting the power IC, apply silicone compound or equivalent heat diffuser to the rear side of power IC, and then follow the steps 1 ~ 4 reversely.



[Fig. 21]

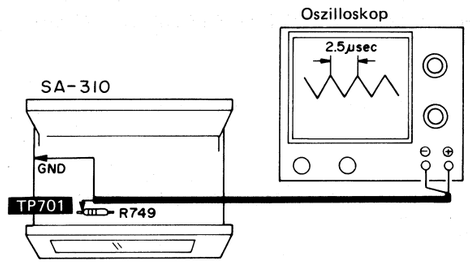
■ MESSUNGEN UND JUSTIERUNGEN

VERSTÄRKER-ABGLEICH

*** Einstellung der Regler und zu verwendende Instrumente.**

1. Vor dem Abgleich sollten VR601 und VR602 entgegen dem Uhrzeigersinn gedreht werden.
2. Haupt-Lautsprecherschalter. . . . . on
3. Neben-Lautsprecherschalter . . . . . off
4. Lautstärke. . . . . 0 (Minimum)
5. Gleichstrom-Voltmeter (für Messung von 5 mV fähig)
6. Oszilloskop

Nr.	ABGLEICHUNGEN	GLEICHSTROM-VOLTMETER-ANSCHLUSS	ZU JUSTIERENDE TEILE	ABGLEICH-METHODE
1	Abgleich von Ico	(L-Kanal) Zwischen TP601 (+) und TP603 (–).	VR601 (L-Kanal)	1. 8Ω-Ersatzwiderstand oder Lautsprecher mit 8Ω Impedanz an den Haupt-Lautsprecheranschluß anschließen. 2. Den Netzschalter einschalten und überprüfen, daß die AUTO-Leuchtdiode (grün) leuchtet. 3. VR601 (L-Kanal) oder VR602 (R-Kanal) so abgleichen, daß die Spannung an jedem Prüfpunkt 15 mV beträgt.
		(R-Kanal) Zwischen TP602 (+) und TP604 (–).	VR602 (R-Kanal)	
2	Abgleich von Vco des Mikrocomputers	———	VR701 (Abgleich von Vco des Mikrocomputers)	1. Oszilloskop an TP701 anschließen. 2. VR701 so abgleichen, daß die Periode der Wellenform 2,5 µsec beträgt. (Siehe Abb. 24)



[Abb. 24]

AM (MW)-EINSTELLUNG

Anmerkung: Die AM OSC-Spule (L203) und AM ZFT (T203) sind bereits justiert und benötigen keine Justierung.

• Stellungen und zu benutzende Geräte

1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
2. AM (MW)-Meßsender (AM-SG)
3. Bereichsschalter . . . . . AM
4. AM (MW) Wellenverteilungs-Wahlschalter auf Position "9 kHz" stellen.
5. Netzspannung auf ihren Sollwerthalten.
6. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute ablesung.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

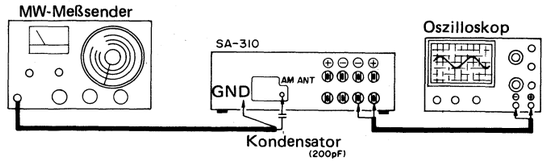
Nr.	AM (MW)-MESSENDER ANSCHLUSS	AM (MW)-MESSENDER FREQUENZ	ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICHSVERFAHREN
	MW-HF-ABGLEICH					
1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenne-neingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	612 kHz (400 Hz Modulat., 30%)	612 kHz	Oszilloskop oder Wechselstrom-Volt-meter uber den Lautsprecher schließen	L202 (Ant. Spule)	1. Auf max. Ausgang abgleichen 2. Den Ferritkern von L202 mit einem Schraubendreher justieren.
2		1503 kHz (400Hz Modulat., 30%)	1503 kHz		CT201 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (1) und (2) wied-erholen, bis die Frequenz genau mit der Skalenanzeige übereinstimmt.

FM (UKW)-EINSTELLUNG

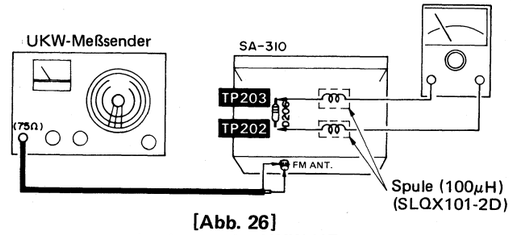
• Stellungen und zu benutzenden Geräte
1. UKW-Meßsender (FM-SG)
2. Verzerrungsmesser
3. Elektronische Voltmeter für Wechsel-und Gleichstrom (VTVM)
4. Signalfrequenzmesser (meßar für 19kHz und 108MHz)
5. Bereichsschalter . . . . . FM
6. Den UKW-Betriebsartenschalter auf die ''mono''-position stellen.
7. Die anderen Einstellungen sind gleich wie beider MW-Justierung.
8. Stereo-Modular (oder Trennmesser)

*** Vorbereitung des UKW-Meßoszillators (UKW-MO)**
1. Stereo-Modulator an FM-SG anschließen.
2. SG Ansgang über 75-Ohm UKW Künstliche Antenne an den Antenneneingang des Gerätes schließen.
3. Die Normal-Eingangs eistung dieses Gerätes beträgt 60dB (1mV), 400Hz, 100% Modulation. (Wegen der Dämpfung bei Verwendung von Koaxialkabeln, muß die MO-Ausgangsleistung 6dB oder mehr (IHF) betragen; d. h. wenn die Eingangsleistung 60dB beträgt, muß der MO-Ausgang 66dB betragen.)

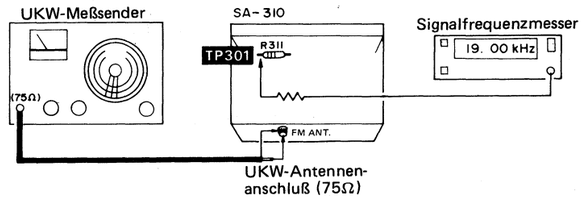
Nr.	FM (UKW) MESSENDER ANSCHLUSS	FM (UKW) MESSENDER FREQUENZ	ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICHSVERFAHREN
	ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO					
3	UKW-MO an den UKW-Antennenanschluß entsprechend Abb. 26. (60dB an den Antennenanschluß legen.)	100.10MHz (400Hz Modulat., 100%)	100.10MHz	Ein Gleichstromröhren-voltmeter zwishen TP202 und TP203 über eine Drosselspule verbinden. (Siehe Abb. 26)	T201 (Diskriminator FT)	1. Den Kern von T201 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
4		100.10MHz (400Hz Modulat., 100%)	100.10MHz	Klirrfaktor-Meßbrücke uber den Lautsprecher schließen	T202 (Diskriminator FT)	1. T202 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.
	JUSTIERUNG DES QUARZVERRIEGELUNGS-ANZEIGE-EIN-PEGELS					
5	UKW-MO an den UKW-Antennenanschluß anschließen. (16dB an den Antennenanschluß anlegen.)	100,1MHz (100% Modulation mit 400Hz)	100,10MHz	———	VR201	1. Gleichstrom-Voltmeter zwischen TP202 und TP203 anschließen, dann T201 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
	TRENNUNGS-JUSTIERUNG					
6	Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (Stereo-Pilotsignal 10% moduliert.)	100.10MHz (400Hz Modulat., 100%) L-oder R-Betriebs-art.)	100,10MHz	Oszilloskop oder Wechselstrom-Volt-meter über den Lautsprecher schließen.	VR302 (Trennungs)	1. VR302 auf minimale Anzeige des R-Ausgangs bei Stereomodulator in L (L-Kanalmodulation) Modus, und auf minimale Anzeige des L-Ausgangs in R-Modus abgleichen.
	UKW-STEREO-DEKODER-ABGLEICH					
	UNTER VERWENDUNG EINES ZAHLES			ALTERNATIV-MEB METHODE		
7	1. Unmodulierts Mono-Signal 100.1MHz in das Gerät speisen. 2. FM muting/mode-Schalter auf ''on/FM auto'' stellen. 3. Zähler über einen Widerstand 100k ohm an TP301 schließen. 4. **VR301** auf 19kHz ±30Hz einstellen.			1. Stereosignal entweder von einem Stereogenerator. Oder einem Sender einspeisen. 2. **VR301** so einstellen, bis die Stereolampe auf leuchtet. Schleifer von **VR301** sichern, wie in Abb. 28 gezeigt.		
	FM-ANALOG-FREQUENZMESSER					
8	———	Kein Signal	96,10 MHz	———	VR901 (Frequenzmesser)	1. VR901 so abgleichen, daß der Frequenzmesser 96,1 MHz anzeigt. (Siehe Abb. 29) 2. Anschließend mit dem Abstimmknopf so einstellen, daß auf der Digital-Frequenz-anzeige 88,1 MHz und 107,9 MHz angezeigt werden. Dann überprüfen, daß die Anzeige mit jedem Buchstaben in Kontakt ist. 3. Falls die Anfordung in Schritt 2 nicht erfüllt wird, zu Schritt 1 zurückkehren und die Anzeige zwischen die gestrichelten Linien in Abb. 29 abgleichen.



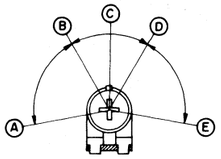
[Abb. 25]
Justierung der MW-HF



[Abb. 26]
Justierung der UKW-HF

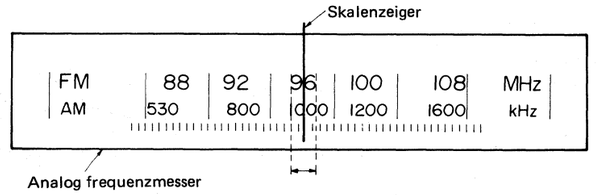


[Abb. 27]
Justierung der UKW-MPX-VCO



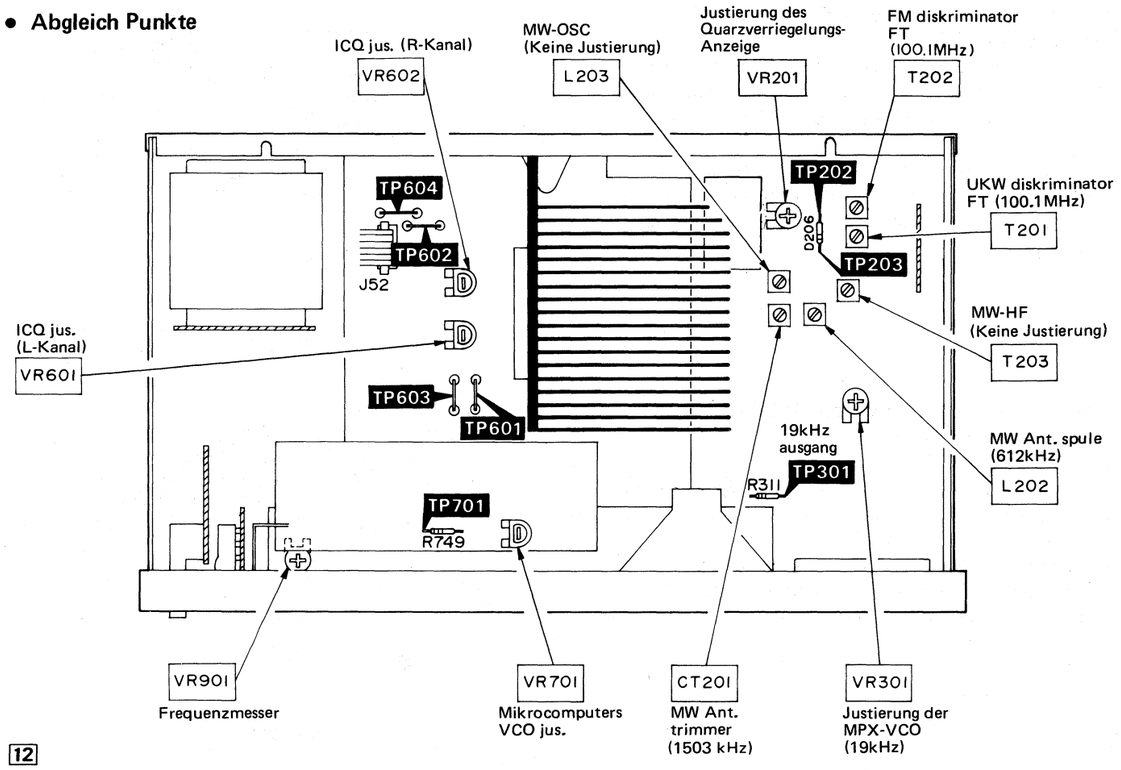
Ⓐ–Ⓑ,Ⓓ–Ⓔ : Stereo Aus-Position
Ⓑ–Ⓓ : Stereo Ein-Position (Anzeige leuchtet)
Ⓒ : Punkt der Pilot-Schaltung justieren

[Abb. 28]



[Abb. 29]
UKW analog frequenzmesser

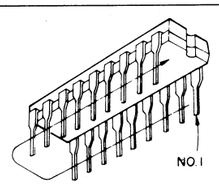
• Abgleich Punkte



■ PRINTED CIRCUIT BOARDS

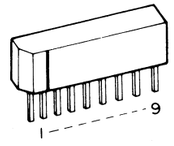
Ground (Earth) lines

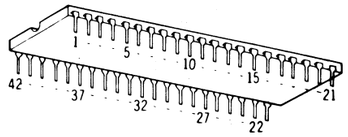
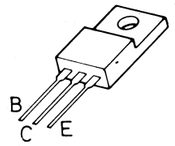
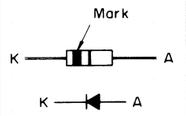
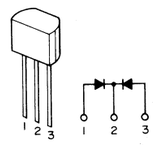
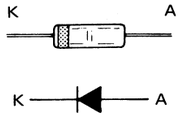
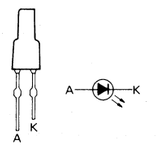
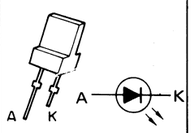
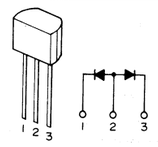
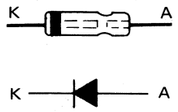
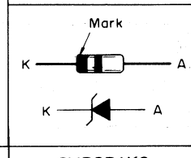
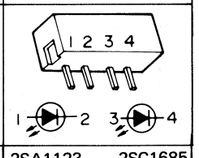
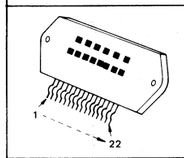
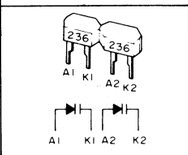
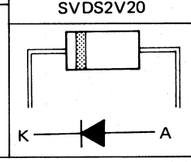
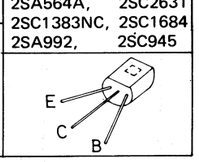
- **Terminal guide of transistors, diodes and IC's**



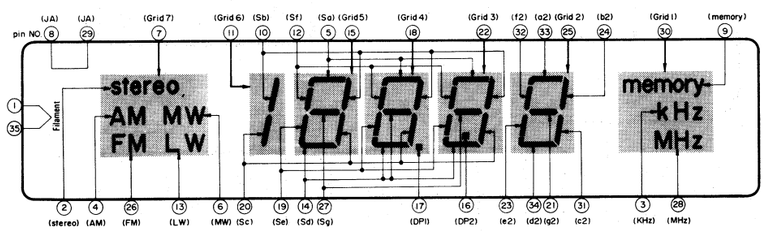
AN6558F	8 pin
SVIUPB553AC	
AN7062	18 pin
AN7273B	
AN6873N	
SVIμPC1161C3	16 pin
MN1421STA	28 pin

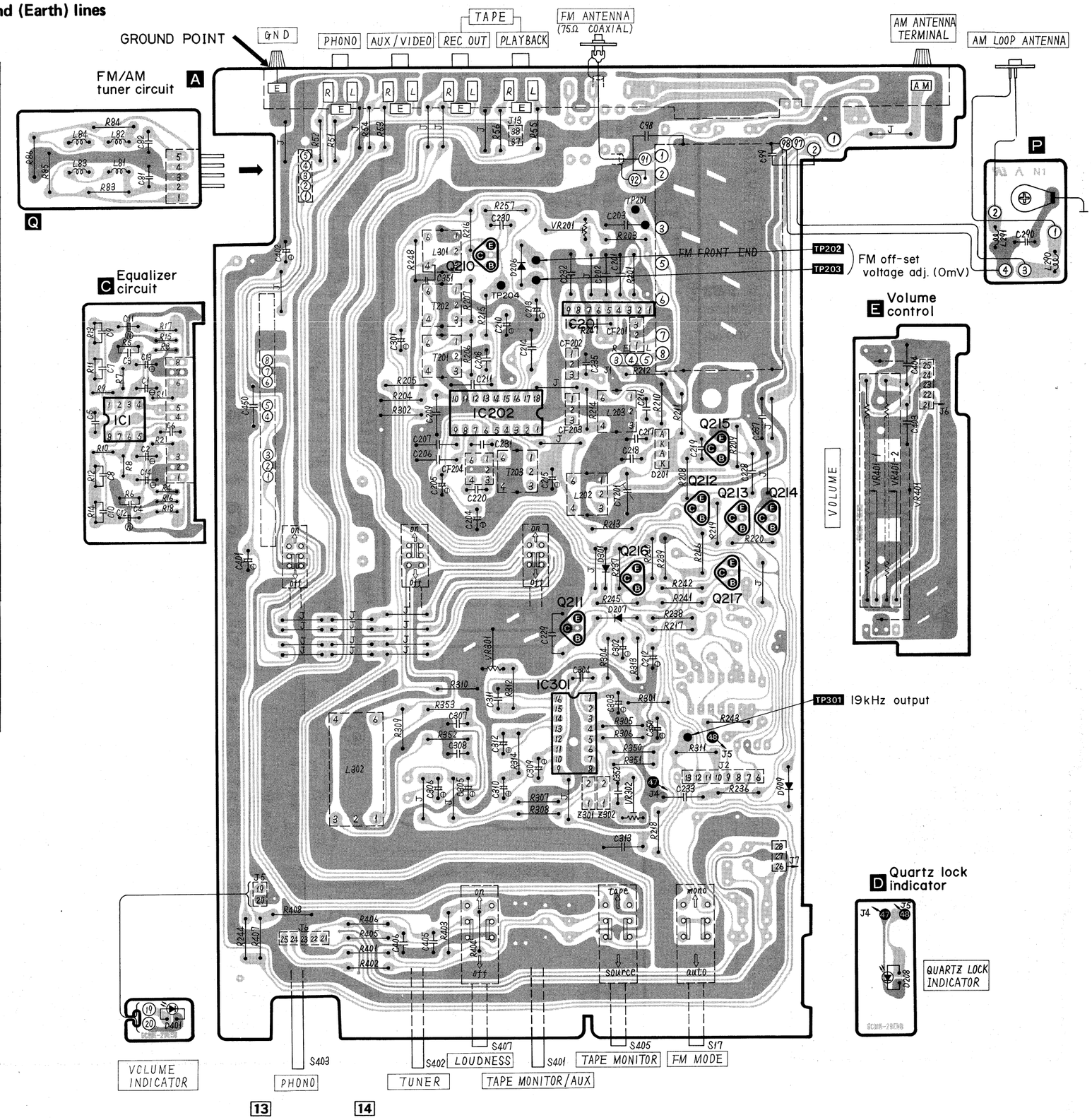
AN278



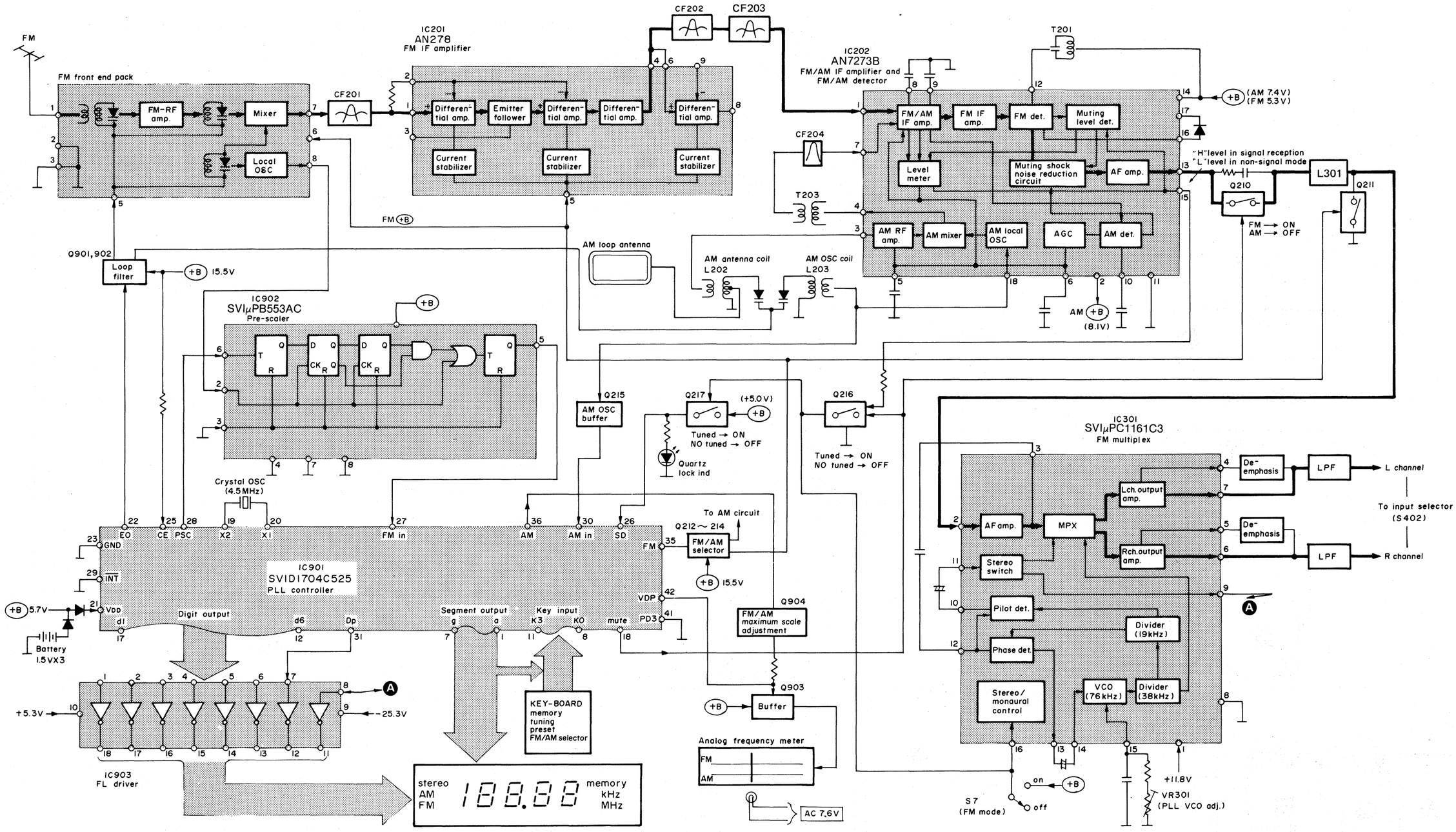
SVID1704 C525		2SD1265	MA162A
			
SVDMC921	MA150, MA27WA	LN846RP	LN224RP, LN446YP
			
SVDMC911	20A90	MA1062M, MA1270M, MA1160L	LN0202GP6 LN0202YP4
			
SVISTK2038-2	SVDKV1236Z	SVDSR1K2 SVDS2V20	2SA1123, 2SC1685 2SA564A, 2SC2631 2SC1383NC, 2SC1684 2SA992, 2SC945
			

- **Fluorescent Display Tube (FL)**

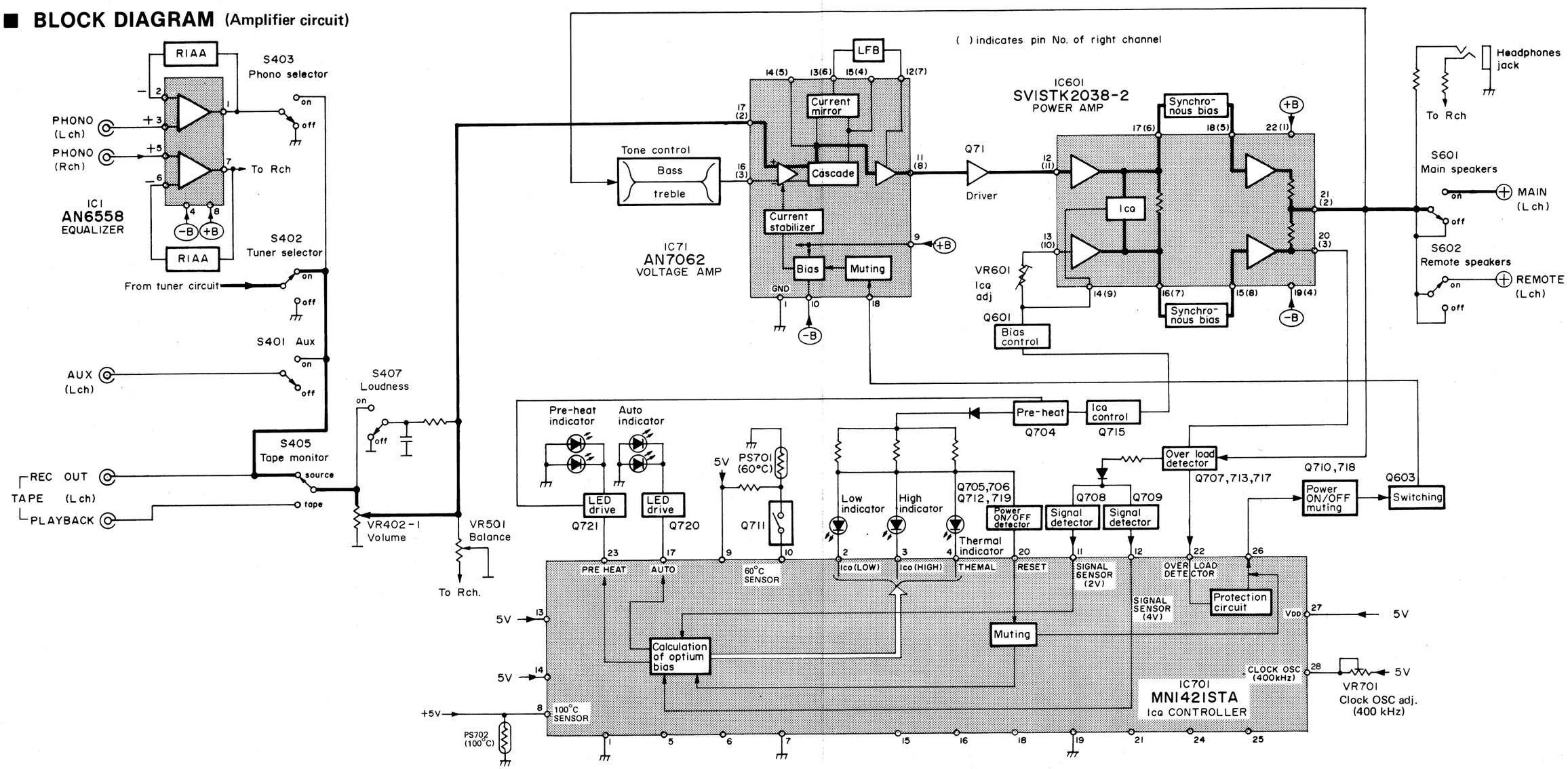

pin NO.
(JA) (JA) (Grid7) (Grid6) (Sb) (Sf) (So) (Grid5) (Grid4) (Grid3) (f2) (o2) (Grid2) (b2) (Grid1) (memory)
8 29 7 11 10 12 5 15 18 22 32 33 25 24 30 9
stereo
AM MW
FM LW
memory
kHz
MHz
Filament
1 35
2 4 26 13 6 20 19 14 27 17 16 23 34 21 31 3 28
(stereo) (AM) (FM) (LW) (MW) (Sc) (Se) (Sd) (Sg) (DP1) (DP2) (e2) (d2) (g2) (c2) (KHz) (MHz)



■ BLOCK DIAGRAM (Tuner Circuit)



■ BLOCK DIAGRAM (Amplifier circuit)



Ica: The heat-sink is preheated in order to assure immediate operation of the bias circuit when the power is switched on.

preheat indicator ——— During this preheating, the "preheat" indicator illuminates.

auto indicator ——— When the circuit is stable, the "auto" indicator illuminates.

Sensor: When the "auto" indicator illuminates, the music signal level and the temperature of the radiator and output transistor are detected.

low indicator / high indicator
* No signal: both low and high LED's are on.
* Low signal: low LED is off.
* High signal: both high and low LED's are off.

thermal indicator — Temperature of the radiator exceeds 60°C, thermal LED turns off.

- **LED ON operation with power ON**

(When power supply is turned ON, Vcc is applied to pin ⑳ (reset) of IC701 (MN1421STA), causing the program operation to start.

Output port	⑰ pin EO2	㉓ pin DO0	③ pin CO8	② pin CO9	④ pin CO7	㉖ pin DO3
indicator sec.	Ica auto	Ica preheat	bias low	bias high	sensor thermal	Muting
Power "ON"	L	L	L	L	L	Muting ON
0.5 sec.						L
1 sec.	H			H	H	
1 sec.			H			
1 sec.				H	L	
1 sec.			L		H	Muting off
10 sec.						H
	L	H	LED turns ON/OFF according to the signal level or temperature alteration.			

about 14.5 sec.

This operation is programed

"ON" (light up) time

■ OPERATION OF Icq CONTROLLER

• Icq control circuit

a) Preheat

When the power is turned on pin **23** (DO_0) of IC701 goes low. Q721 turns on, illuminating the preheat LED (D717). Q704 also turns on. Q715 (Q716) conducts heavily and increases the Icq through Q601 (Q602) to pin **14** (9) of IC601. For approximately 15 seconds the the Icq should be 2 times higher than normal.

b) Signal sensor

Q708 is set to turn on when the output from pin **21** (2) of IC601 exceeds 2V. At that time pin **11** (BI_3) of IC701 goes low and pin **2** (CO_9) goes high. The "low" LED turns off. The collector current of Q715 (Q716) reduces and decreases the bias current. Q709 turns on when the output exceeds 4V. Pin **12** (BI_2) goes low and pin **3** (CO_8) goes high. The "high" LED turns off and the current through Q715 (Q716) is further decreased.

c) Thermal sensor

When the thermistor (PS701) temperature reaches 60°C, Q711 turns on. Pin **10** (AI_0) of IC701 goes low and pin **4** (CO_7) goes high. This causes a decrease in the collector current of Q715 (Q716) and the thermal LED (D720) turns off.

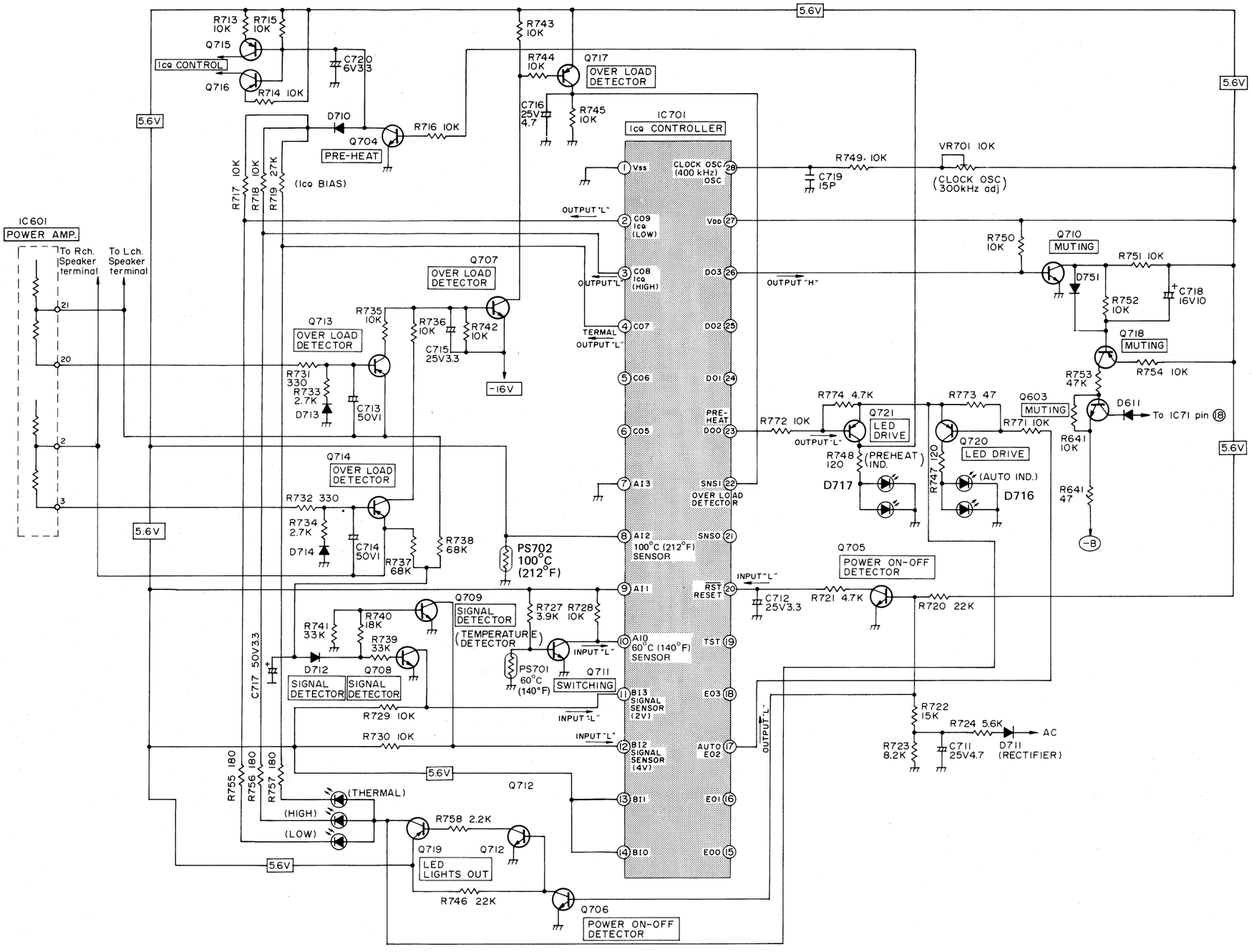
The combination of the signal and thermal sensors serve to change the total impedance of R717 ~ R719 (Bias) to determine the level of Icq applied.

• Muting circuit

When the power is turned on, pin **26** (DO_3) of IC701 goes high for about 4 secones, Q710, Q718 and Q603 turn on to activate IC71 (voltage amplifier).

When the power is turned off, Q705 turns on and pin **20** (RST) of IC701 goes low. Pin **26** (DO_3) also goes low and Q710, Q718 and Q603 turn off to disable IC71 (voltage amplifier).

When there is a large amount of signal the voltage across R731 (R732) increases to the point that Q713 (Q714) turns on, pin **22** (SNS_1) of IC701 goes high and pin **26** (DO_3) goes low to disable IC71 (voltage amplifier).



■ FUNCTION OF TERMINAL (Icq CONTROLLER IC701)

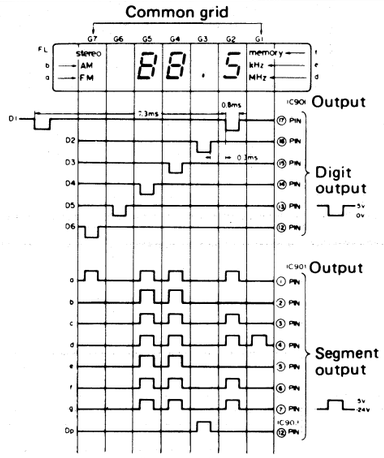
Pin No.	Mark	Name of block	Description of terminal
1	Vss	Power supply input terminal	Grounded (0V)
2	CO_9	Output port C	It delivers Icq control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO_8		
4	CO_7		
5	CO_6		
6	CO_5		
7	AI_3	Input port A	Grounded (0V)
8	AI_2		When 100°C (212°F) sensor of power amplifier operates, the input level becomes "H".
9	AI_1		Apply 5.6V
10	AI_0		When 60°C (140°F) sensor of power amplifier operates, the input level becomes "L".
11	BI_3	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
12	BI_2		Input level changes to "L" as effective output 4V signal sensor of power amplifier operates.
13	BI_1		Apply 5V
14	BI_0		
15	EO_0	Output port E	Not used in this unit.
16	EO_1		
17	EO_2		Indicator "auto" lights up at "L" output.
18	EO_3		Not used in this unit.
19	TST	Test input terminal	Terminal for testing LSI (Grounded)
20	RST	Reset input terminal	All outputs are cleared or reset with input at "L" . (It is connected to power supply circuit)
21	SNS_0	Sensor input terminal	Not used in this unit.
22	SNS_1		Input level changes to "H" as power amplifier output short-circuit detector operates.
23	DO_0	Output port D	Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
24	DO_1		Not used in this unit.
25	DO_2		
26	DO_3		Output muting circuit to turns ON with output at "H".
27	V_{DD}	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

■ FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 30)
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 4V 0V
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. (Refer to Fig. 30)
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. Power "ON" Power "OFF" 700µs 4V 0V Muting "ON" Muting "OFF"
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.

Pin No.	Mark	Description of terminal
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held. Power "ON" Power "OFF" 4V 0V The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. Pulse two times larger than the value that cannot be divided by VCO/16. 1/17 1/16 5V 0V 25kHz
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 2.8V 1.7V 1 MHz ~ 2 MHz

Pin No.	Mark	Description of terminal
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	This is 4-bit input/output port. PB2 terminal (35), is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. Other terminals are not used in this unit.
34	PB1	
35	PB2	
36	PB3	
37	PA0	This is 4-bit input/output port. (Not used in this unit)
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.



[Fig. 30]

■ RESISTORS & CAPACITORS

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "**S**" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω(ohm), K = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is µF (microfarad). P = 10^{-6} µF
6. Bracketed indications in Ref. No. columns spedify the area. Parts without these indications can be used for all areas.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value
ERG	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ± 5%
ERG : Metal Oxide	12 : 1/2W	K : ± 10%
ERQ : Fuse Type Metal	25 : 1/4W	
	1 : 1W	
ERC : Solid	2 : 2W	
	S1 : 1/2W	

ERD10TLJ□□□ → Chip type carbon
ERO10MKG□□□ → Chip type metal film

Numbering System of Capacitor

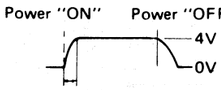
Example

ECKD	1H	102	Z	F
Type	Volgage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity	Value	Special use

Capacitor Type	Voltage: ECEA Type	Voltage: Order	Tolerance
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	J : ± 5%
ECKD : Ceramic	1C : 16V	KC : 400V AC	K : ± 10%
ECQM : Polyester	1E : 25V	1 : 100V	Z : +80%, −20%
ECQP : Polypropylene	1H : 50V	45 : 45V DC	N : ± 30%
ECET : Electrolytic	1V : 35V	HS : 400V AC	P : +100%, −0%
ECEA..... N: Non Polar Electrolytic	50 : 50V		
ECBT : Axial Leaded Type Ceramic	25 : 25V		

Ref. No.		Part No.
RESISTORS		
R1,2		ERD10TLJ391U
R3,4		ERD10TLJ224U
R5,6		ERO10MKG5622
R7,8		ERD10TLJ271U
R9,10		ERD10TLJ680U
R11,12		ERD10TLJ184U
R13,14		ERD10TLJ123U
R15,16		ERD10TLJ563U
R17,18		ERD10TLJ102U
R51,52	S	ERD25FJ152
R53,54	S	ERD25FJ472
R55,56	S	ERD25FJ472
R71,72		ERD10TLJ334U
R73,74		ERD10TLJ102U
R75,76		ERD10TLJ124U
R77,78		ERD10TLJ103U
R79,80		ERD10TLJ220U
R83,84	S	ERD25FJ272
R85,86	S	ERD25TJ104
R201	S	ERD25FJ331
R203	S	ERD25FJ221
R204	S	ERD25FJ102
R205	S	ERD25FJ471
R206	S	ERD25FJ472
R208	S	ERD25FJ103
R209	S	ERD25TJ684
R210	S	ERD25TJ104
R211	S	ERD25FJ102
R212	S	ERD25FJ562
R213	S	ERD25FJ152
R214	S	ERD25FJ681
R215	S	ERD25FJ103
R216	S	ERD25TJ104
R217	S	ERD25FJ392
R218	S	ERD25TJ104
R219	S	ERD25TJ473
R220	S	ERD25FJ103
R236	S	ERD25TJ473
R237,238	S	ERD25FJ103
R239	S	ERD25FJ561

Ref. No.		Part No.
CAPACITORS		
C1,2	S	ECEA50M3R3R
C3,4	S	ECCD1H101K
C5,6	S	ECKD1H471KB
C7.8	S	ECQM1H223JZ
C9,10	S	ECQM1H682JZ
C11,12	⚠S	ECEA1HN010S
C13,14	S	ECEA1CS330
C71,72	S	ECEA50Z3R3
C73,74	S	ECCD1H390K
C75,76	S	ECCD1H820K
C77,78	S	ECKD1H391KB
C81,82	S	ECCD1H560KC
C98		ECKD1H103ZF
C99	S	ECKD1H103ZF
C201,202		ECBT1C103ZYY
C203		ECBT1C223NYY
C204	S	ECEA1AS101
C205	S	ECEA50Z3R3
C206		ECBT1C103ZYY
C207		ECBT1C223NYY
C208	S	ECCD1H470K
C209		ECBT1C223NYY
C210	S	ECEA1HS100
C211		ECBT1C103ZYY
C212	S	ECEA50ZR47
C213	S	ECEA50Z1
C214		ECBT1C103ZYY
C215	S	ECEA1HS100
C216		ECQP1471JZ
C217	S	ECCD1H100KC

Pin No.	Mark	Description of terminal
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.  The device does not operate during this period.
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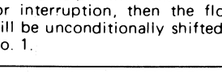
30	AM	Input terminal for AM OSC output. 

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35	PB2	
36	PB3	
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38	PA1	
39	PA2	
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41	PD3	One-bit input/output port. (Not used in this unit.)
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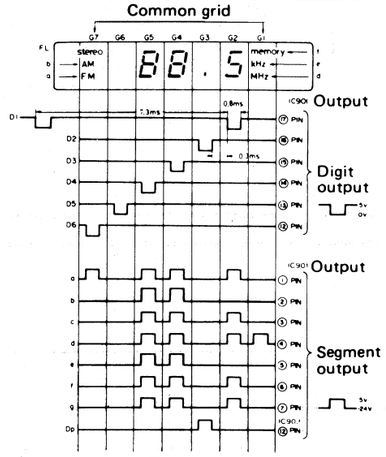

[Fig. 30]

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Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
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ERG : Metal Oxide	12 : 1/2W	K : ± 10%
ERQ : Fuse Type Metal	25 : 1/4W	
ERC : Solid	1 : 1W	
	2 : 2W	
	S1 : 1/2W	

ERD10TLJ □□□ → Chip type carbon
ERO10MKG□□□ → Chip type metal film

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Volgage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity	Value	Special use

Capacitor Type	Voltage: ECEA Type	Voltage: Order	Tolerance
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	J : ± 5%
ECKD : Ceramic	1C : 16V	KC : 400V AC	K : ± 10%
ECQM : Polyester	1E : 25V	1 : 100V	Z : +80%, −20%
ECQP : Polypropylene	1H : 50V	45 : 45V DC	N : ± 30%
ECET : Electrolytic	1V : 35V	HS : 400V AC	P : +100%, −0%
ECEA..... N: Non Polar Electrolytic	50 : 50V		
ECBT : Axial Leaded Type Ceramic	25 : 25V		

Ref. No.		Part No.	Value
RESISTORS			
R1,2		ERD10TLJ391U	390
R3,4		ERD10TLJ224U	220K
R5,6		ERO10MKG5622	56.2K
R7,8		ERD10TLJ271U	270
R9,10		ERD10TLJ680U	68
R11,12		ERD10TLJ184U	180K
R13,14		ERD10TLJ123U	12K
R15,16		ERD10TLJ563U	56K
R17,18		ERD10TLJ102U	1K
R51,52	S	ERD25FJ152	1.5K
R53,54	S	ERD25FJ472	4.7K
R55,56	S	ERD25FJ472	4.7K
R71,72		ERD10TLJ334U	330K
R73,74		ERD10TLJ102U	1K
R75,76		ERD10TLJ124U	120K
R77,78		ERD10TLJ103U	10K
R79,80		ERD10TLJ220U	22
R83,84	S	ERD25FJ272	2.7K
R85,86	S	ERD25TJ104	100K
R201	S	ERD25FJ331	330
R203	S	ERD25FJ221	220
R204	S	ERD25FJ102	1K
R205	S	ERD25FJ471	470
R206	S	ERD25FJ472	4.7K
R208	S	ERD25FJ103	10K
R209	S	ERD25TJ684	680K
R210	S	ERD25TJ104	100K
R211	S	ERD25FJ102	1K
R212	S	ERD25FJ562	5.6K
R213	S	ERD25FJ152	1.5K
R214	S	ERD25FJ681	680
R215	S	ERD25FJ103	10K
R216	S	ERD25TJ104	100K
R217	S	ERD25FJ392	3.9K
R218	S	ERD25TJ104	100K
R219	S	ERD25TJ473	47K
R220	S	ERD25FJ103	10K
R236	S	ERD25TJ473	47K
R237,238	S	ERD25FJ103	10K
R239	S	ERD25FJ561	560
R240	S	ERD25TJ104	100K
R241	S	ERD25TJ333	33K
R242	S	ERD25TJ274	270K
R243	S	ERD25FJ271	270
R244	S	ERD2FCG101	100
R245	S	ERD25TJ104	100K
R246	S	ERD25TJ684	680K
R247	S	ERD25FJ331	330
R248	S	ERD25FJ682	6.8K
R250	S	ERD25FJ821	820
R257	S	ERD25TJ473	47K
R301	S	ERD25FJ151	150
R302	S	ERD25TJ104	100K
R304	S	ERD25TJ273	27K
R305,306	S	ERD25TJ223	22K
R307,308	S	ERD25FJ122	1.2K
R309,310	S	ERD25TJ472	4.7K
R311	S	ERD25FJ392	3.9K
R312	S	ERD25TJ153	15K
R313	S	ERD25FJ103	10K
R314	S	ERD25FJ102	1K
R315	S	ERD25TJ823	82K
R350,351	S	ERD25FJ822	8.2K
R352,353	S	ERD25FJ122	1.2K
R401,402	S	ERD25FJ222	2.2K
R403,404	S	ERD25TJ183	18K
R405,406	S	ERD25TJ393	39K
R407	S	ERD25FJ821	820
R408	S	ERD25FJ271	270
R501,502	S	ERD25FJ392	3.9K
R503,504	S	ERD25FJ561	560
R505,506	S	ERD25TJ183	18K
R507,508	S	ERD25FJ392	3.9K
R509,510	S	ERD25FJ561	560
R511,512	S	ERD25TJ123	12K
R517,518	S	ERD25TJ154	150K
R601	S	ERD25TJ473	47K
R602	⚠S	ERD25FJ470	47
R603,604	S	ERD25TJ563	56K
R605,606	S	ERD25TJ683	68K
R609,610	S	ERD25FJ331	330
R611,612	S	ERD25TJ154	150K
R613,614	⚠	ERDS1FJ102	1K
R615,616	S	ERD25FJ222	2.2K
R617,618	⚠	ERDS1FJ561	560
R619,620	S	ERD25TJ393	39K
R621,622	⚠	ERDS1FJ820	82
R623,624	S	ERD25FJ102	1K
R625,626	S	ERD25TJ824	820K
R627,628	S	ERD25TJ824	820K
R629,630	⚠S	ERD25FJ561	560
R631,632	⚠S	ERD25FJ102	1K
R633,634	S	ERD25FJ103	10K
R635,636	⚠	ERDS1FJ100	10
R637,638	⚠	ERDS1FJ4R7	4.7
R639,640	⚠	ERDS1FJ331	330
R641	⚠S	ERD25FJ470	47
R642	S	ERD25FJ103	10K
R645	S	ERD25TJ104	100K
R702		ERQ1AJP150	15
R703	⚠S	ERDS1FJ152	1.5K
R704	S	ERD25FJ821	820
R705	S	ERD25FJ681	680
R706	S	ERD25FJ272	2.7K
R707	S	ERD25FJ222	2.2K
R708	S	ERG1ANJ470	47
R709	⚠	ERDS1FJ821	820
R710	⚠	ERDS1FJ152	1.5K
R711	S	ERD25FJ221	220
R713,714	S	ERD25FJ103	10K
R715,716	S	ERD25FJ103	10K
R717,718	S	ERD25FJ103	10K
R719	S	ERD25FJ272	2.7K
R720	S	ERD25TJ223	22K
R721	S	ERD25FJ472	4.7K
R722	S	ERD25TJ153	15K
R723	S	ERD25TJ123	12K
R724	S	ERD25FJ562	5.6K
R727	S	ERD25FJ822	8.2K
R728,729	S	ERD25FJ103	10K
R730	S	ERD25FJ103	10K
R731,732	⚠	ERDS1FJ331	330
R733,734	S	ERD25FJ272	2.7K
R735,736	S	ERD25TJ563	56K
R737,738	S	ERD25TJ683	68K
R739	S	ERD25TJ333	33K
R740	S	ERD25TJ183	18K
R741	S	ERD25TJ333	33K
R742	S	ERD25TJ563	56K
R743,744	S	ERD25FJ103	10K
R745	S	ERD25FJ103	10K
R746	S	ERD25TJ223	22K
R747,748	S	ERD25FJ121	120
R749,750	S	ERD25FJ103	10K
R751	S	ERD25FJ332	3.3K
R752	S	ERD25TJ224	220K
R753	S	ERD25TJ473	47K
R754	S	ERD25FJ103	10K
R755,756	S	ERD25FJ181	180
R757	S	ERD25FJ181	180
R758	S	ERD25FJ222	2.2K
R771,772	S	ERD25FJ103	10K
R773,774	S	ERD25FJ472	4.7K
R780	S	ERD25FJ822	8.2
R799	S	ERD25FJ103	10K
R901	S	ERD25FJ102	1K
R902	S	ERD25FJ561	560
R903	S	ERD25FJ682	6.8K
R904	S	ERD25FJ562	5.6K
R905	S	ERD2FCG101	100
R906	S	ERD25FJ151	150
R907	S	ERD25FJ103	10K
R908	S	ERD25TJ273	27K
R909	⚠	ERDS1FJ680	68
R910	S	ERD25FJ681	680
R911	S	ERD25FJ103	10K
R912	S	ERD25TJ224	220K
R913	S	ERD25TJ563	56K
R914	S	ERD25TJ104	100K

Ref. No.		Part No.	Value
CAPACITORS			
C1,2	S	ECEA50M3R3R	3.3
C3,4	S	ECCD1H101K	100P
C5,6	S	ECKD1H471KB	470P
C7,8	S	ECQM1H223JZ	0.022
C9,10	S	ECQM1H682JZ	0.0068
C11,12	⚠S	ECEA1HN010S	1
C13,14	S	ECEA1CS330	33
C71,72	S	ECEA50Z3R3	3.3
C73,74	S	ECCD1H390K	39P
C75,76	S	ECCD1H820K	82P
C77,78	S	ECKD1H391KB	390P
C81,82	S	ECCD1H560KC	56p
C98		ECKD1H103ZF	0.01
C99	S	ECKD1H103ZF	0.01
C201,202		ECBT1C103ZYY	0.01
C203		ECBT1C223NYY	0.022
C204	S	ECEA1AS101	100
C205	S	ECEA50Z3R3	3.3
C206		ECBT1C103ZYY	0.01
C207		ECBT1C223NYY	0.022
C208	S	ECCD1H470K	47P
C209		ECBT1C223NYY	0.022
C210	S	ECEA1HS100	10
C211		ECBT1C103ZYY	0.01
C212	S	ECEA50ZR47	0.47
C213	S	ECEA50Z1	1
C214		ECBT1C103ZYY	0.01
C215	S	ECEA1HS100	10
C216		ECQP1471JZ	470P
C217	S	ECCD1H100KC	10P
C218		ECQM1H473KV	0.047
C219	S	ECCD1H180KC	18P
C220	S	ECCD1H470K	47P
C228		ECBT1C103ZYY	0.01
C229		ECBT1C223NYY	0.022
C230	S	ECQM1H183JZ	0.018
C231	S	ECCD1H080CC	8P
C232		ECBT1C103ZYY	0.01
C233		ECBT1C103ZYY	0.01
C235	S	ECCD1H470K	47P
C237		ECBT1C103ZYY	0.01
C250		ECCD1H150KC	15P
C290	S	ECKD1H102ZF	0.001
C301	S	ECEA50Z2R2	2.2
C302	S	ECEA25Z4R7	4.7
C303	S	ECEA1ES101	100
C304		ECQM1H473KV	0.047
C305,306	S	ECEA50Z2R2	2.2
C307,308	S	ECQM1H153JZ	0.015
C309	S	ECEA50Z1	1
C310	S	ECEA50Z3R3	3.3
C311		ECQP1471JZ	470P
C312	S	ECEA50Z1	1
C313		ECBT1C103ZYY	0.01
C350	S	ECEA1AS470	47
C351	S	ECCD1H101K	100P
C352	S	ECCD1H121K	120P
C401,402	S	ECEA1HS100	10
C403,404		ECBT1H331KBY	330P
C405,406		ECQM1H563KV	0.056
C450		ECBT1C103ZYY	0.01
C501,502		ECQM1H222KV	0.0022
C503,504	S	ECQM1H223JZ	0.022
C505,506	S	ECQM1H183JZ	0.018
C507,508		ECQM1H104KV	0.1
C509,510	S	ECEA25Z4R7	4.7
C511,512	S	ECCD1H150KC	15P
C601,602	S	ECEA1HS100	10
C603,604	S	ECCD1H050CC	5P
C605,606	S	ECKD1H821KB	820P
C607,608	S	ECCD1H220K	22P
C609,610	S	ECCD1H180KC	18P
C611	S	ECEA1HS101	100
C612	S	ECEA50Z1	1
C613,614	S	ECCD1H151K	150P
C615,616	S	ECKD1H103ZF	0.01
C617,618	S	ECEA50Z3R3	3.3
C619,620	S	ECKD1H221KB	220P
C621,622	S	ECKD1H221KB	220P
C623,624		ECQM1H104JZ	0.1
C625,626		ECQM1H563KV	0.056
C651,652	S	ECKD1H102ZF	0.001
C653,654	S	ECKD1H102ZF	0.001
C655,656	S	ECKD1H103ZF	0.01
C657,658	S	ECKD1H103ZF	0.01
C659,660	S	ECKD1H102ZF	0.001
C701	⚠	ECKDKC103PF2	0.01
C702	⚠	ECQE1104KN	0.1
C703,704	⚠	ECETS45V682U	6800
C705	S	ECEA1ES101	100
C706	S	ECKD1H103ZF	0.01
C707	S	ECEA1HS100	10
C708	S	ECKD1H103ZF	0.01
C709	S	ECEA1VS330	33
C710	S	ECEA0JS471	470
C711	S	ECEA25Z4R7	4.7
C712	S	ECEA50Z3R3	3.3
C713,714	S	ECEA50Z1	1
C715	S	ECEA50Z3R3	3.3
C716	S	ECEA25Z4R7	4.7
C717	S	ECEA50Z3R3	3.3
C718	S	ECEA1HS100	10
C719	S	ECCD1H151K	150P
C720	S	ECEA1CS330	33
C721	S	ECKD1H103ZF	0.01
C750	S	ECKD1H223ZF	0.022
C901		ECBT1C103ZYY	0.01
C902	S	ECEA50M4R7R	4.7
C903	S	ECEA1HS100	10
C904,905		ECBT1C103ZYY	0.01
C906	S	ECEA0JS471	470
C907	S	ECCD1H080CC	8P
C908	S	ECCD1H180KC	18P
C909	S	ECEA0JS102	1000
C910	S	ECEA1HS470	47
C911	S	ECEA1VS330	33
C912	S	ECEA1HS100	10
C913	S	ECEA1AS221	220
C914	S	ECEA50ZR47	0.47

■ SCHEMATIC DIAGRAM

1 2 3 4 5 6 7 8 9 10

A B C D E F

FM/AM tuner circuit

A — FM FRONT END PACK SNVFE407G4S Supply of FM FRONT END PACK is assembly

FM RF signal · FM ANT · 75Ω · GND · GROUND POINT

FM RF AMP · FM MIXER · FM OSC · BUFFER · IFT

IC201 AN278 FM IF AMP

CF201 · CF202 · CF203

Quartz ON level-adj. VR201 5K8

FM OSC

IC202 AN7273B FM/AM IF AMP & FM/AM det.

NO	AM	FM	NO	AM	FM
1	6.9	4.8	10	6.6	4.7
2	8.1	0.6	11	–	0
3	8.1	0.6	12	7.4	5.3
4	8.1	0.6	13	1.5	1.9
5	0.9	0.1	14	7.4	5.3
6	1.7	0.1	15	–	1.2
7	6.9	4.8	16	1.5	1.7
8	6.9	4.8	17	–	1.5
9	6.9	4.8	18	8.1	0.6

AM OSC · Q215 2SC1685 AM OSC BUFFER · AM ANT coil · AM OSC coil

AM IFT T203 · CF2043 · IC202 · AM/FM IF AMP · DET · AF AMP · AM MIXER

Q210 2SC1685 SWITCHING FM→ON AM→OFF

Q211 2SC1685 MUTING

FM discri. IFT T201 · T202

D207, 301 MA150

IC301 SVI₄PC1161C3 MULTIPLEX

19kHz output · MPX VOC adj.

Q212 · Q213 · Q214

FM offset voltage

D201 SVDKV1236Z · D206 MA27W

TP202 · TP203 · TP204 · TP301

S17 (FM MODE)

AM ANT · AM LOOP ANT · L290 · L291 · AM RF signal · TP201

P SUP25710

530kHz → 1620kHz (AM) · 87.9MHz → 107.9MHz (FM)

FM OSC

(1/16 or 1/17) FM OSC

SUP26313B

C — Equalizer circuit

Q — SUP25370

D909 MA150 · BATTERY 1.5V x3

GND

(Lch) PHONO · AUX/VIDEO · REC OUT · TAPE/EXT PLAYBACK

R51 1.5K A · R53 4.7K C · E · R55 4.7K G

(Rch) PHONO · AUX/VIDEO · REC OUT · TAPE/EXT PLAY BACK

R52 1.5K B · R54 4.7K D · F · R56 4.7K H

M

B — FM/AM preset-tuning circuit

IC901 SVID1704C525 PLL CONTROLLER

IC902 SVIμPB553AC PRE SCALER

IC903 AN6873N FL DRIVER

Q901, 902 2SC945 LOOP FILTER

Q903 2SC1685 DRIVER

Q904 2SC1685 SWITCHING

Frequency meter adj.

Refer to note on page 33.

D901~913 MA150

D917 MA1062M 6V ZENER

DIGITAL FREQUENCY DISPLAY · SAD7MT29TA

ANALOG FREQUENCY METER · SUP26313G

CK is assembly

IC201 AN278 FM IF AMP

Quartz ON level-adj.

AM IFT

AM ANT coil

AM OSC coil

AM OSC

AM OSC BUFFER

FM offset voltage

FM discri. IFT

MPX VOC adj.

19kHz output

IC202 Q210 2SC1685 SWITCHING FM→ON AM→OFF

Q211 2SC1685 MUTING

D207,301 MA150

IC301 SV1μPC1161C3 MULTIPLEX

Q212 2SC1685

Q213 2SC1685

D201 SVDKV1236Z

D206 MA27W

S17 (FM MODE)

AF signal (L ch)

AF signal (R ch)

Q212 2SA564 FM/AM SELECTOR FM→OFF AM→ON

Q213 2SA564 FM/AM SELECTOR FM→ON AM→OFF

Q214 2SC1685 FM/AM SELECTOR FM→ON AM→OFF

Low Pass Filter

Input selectors

S401 AUX/CD/VIDEO

S402 TUNER

S403 PHONO

Q216 2SC1685 SWITCHING TUNED→ON NO TUNED→OFF

Q217 2SA564 SWITCHING TUNED→ON NO TUNED→OFF

S405 TAPE MONITOR TAPE SOURCE

S407 LOUDNES

SUP26313A

SUP26313B

SUP24313

Equalizer circuit

IC1 AN6558F EQUALIZER AMP

SUP25370

SUP26313D

D208 LN846RP QUARTZ LOCK IND

D401 LN224RP VOLUME IND

SUP26313E

SUP26313C

(1/16 or 1/17) FM OSC

IC901 SVID1704C525 PLL CONTROLLER

Q903 2SC1685 DRIVER

Q904 2SC1685 SWITCHING

Frequency meter adj.

Refer to note on page 33.

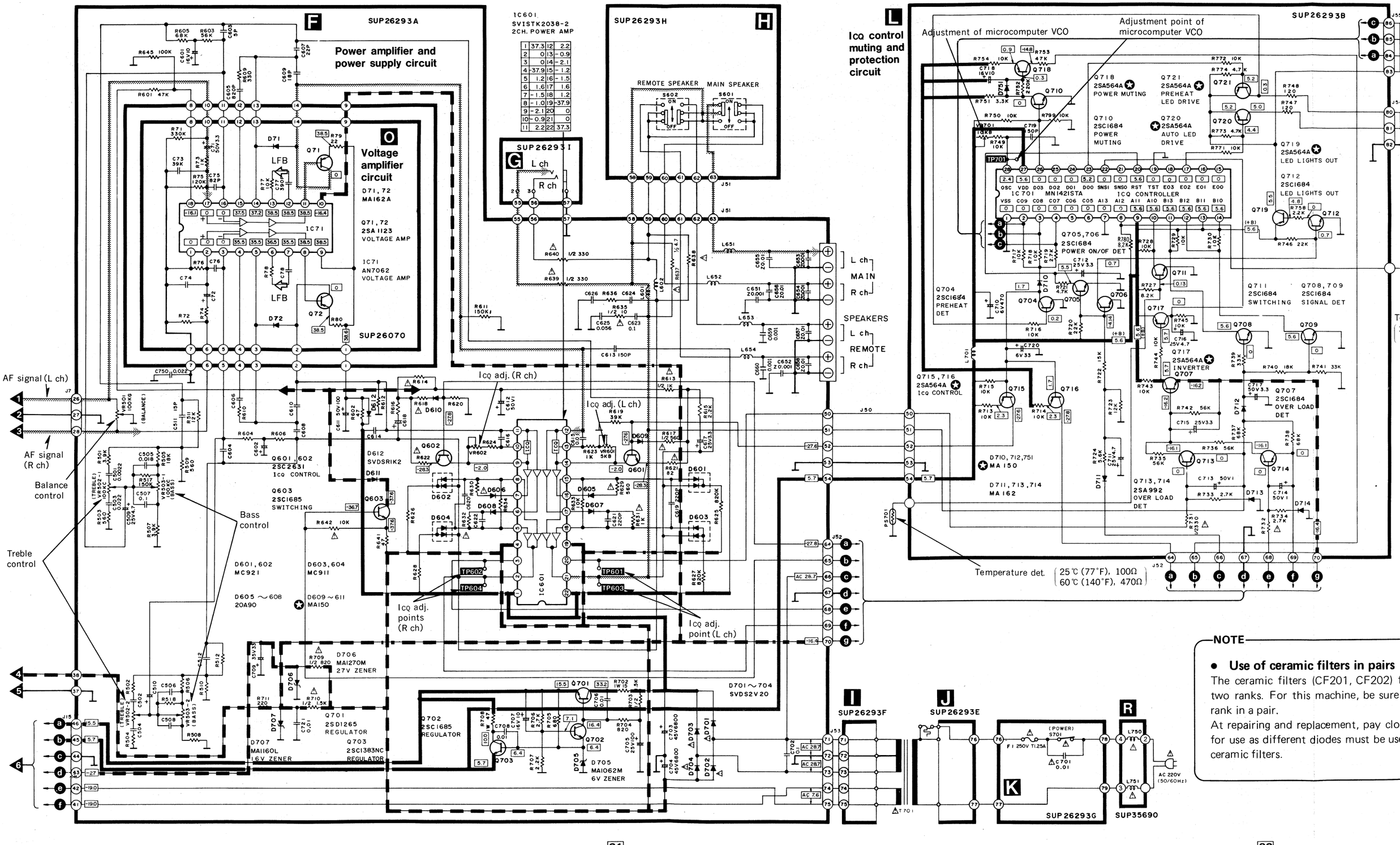
D917 MA1062M 6VZENER

SAD7MT29TA

FREQUENCY DISPLAY

ANALOG FREQUENCY METER

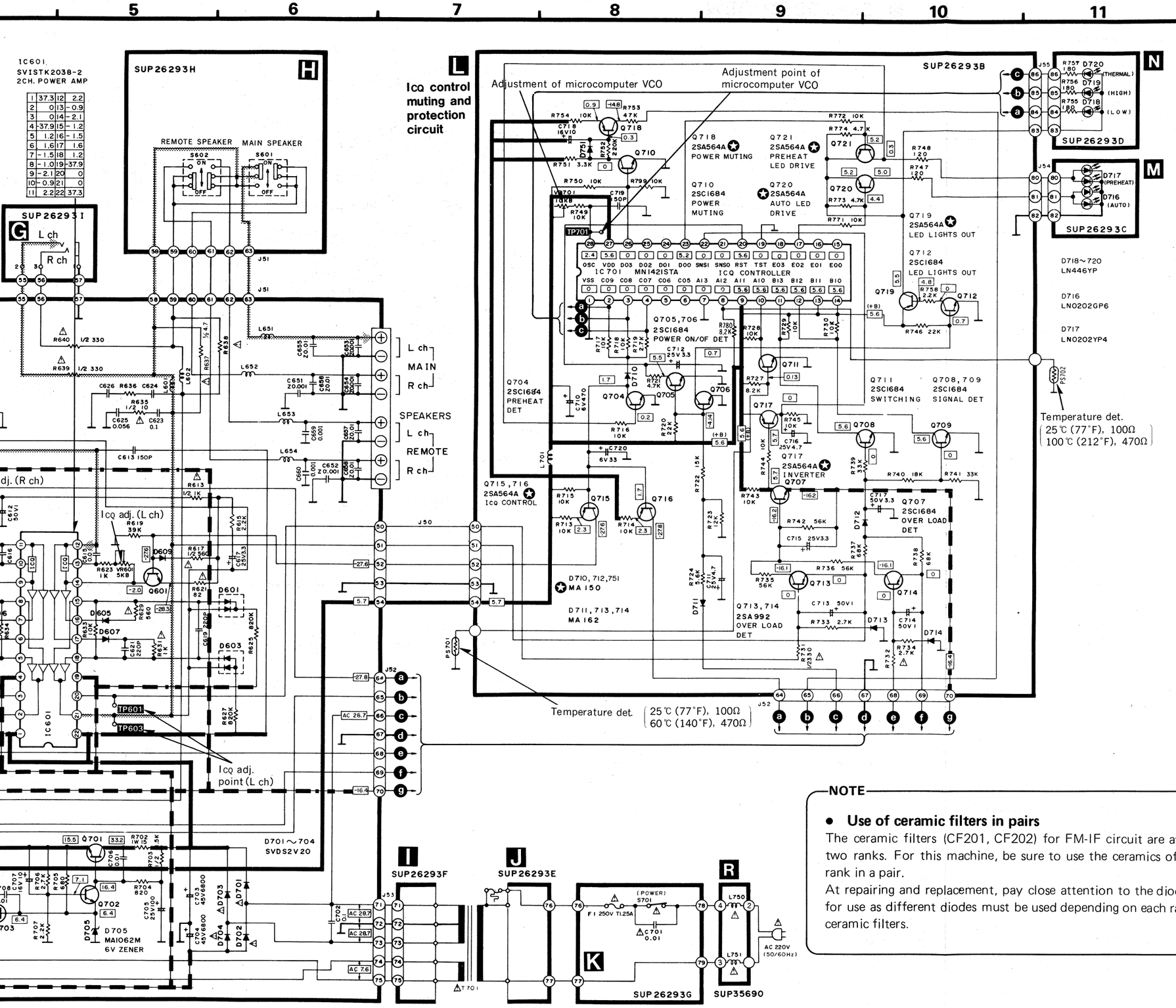
SUP26313G



NOTE

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202) for FM two ranks. For this machine, be sure to us rank in a pair.
At repairing and replacement, pay close att for use as different diodes must be used dep ceramic filters.



■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

*The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

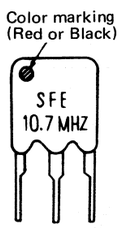
NOTE

1. **S1** : FM frequency-shift selector switch. off◄►+25 kHz
2. **S3, 4** : Band selector switch [S3 —— AM / S4 —— FM]
3. **S5, 6** : Tuning switch. [S5 —— down (tuning to lower frequency) / S6 —— up (tuning to higher frequency)]
4. **S7** : Memory switch.
5. **S8 ~ 15** : Preset tuning switch. [S8 —— CH. 1, S9 —— CH. 2, S10 —— CH. 3, S11 —— CH. 4, S12 —— CH. 5, S13 —— CH. 6, S14 —— CH. 7, S15 —— CH. 8]
6. **S17** : FM mode selector switch. (auto◄►mono)
7. **S401 ~ 403** : Input selector switch in "**tuner**" position. [S401 —— phono / S402 —— tuner / S403 —— aux]
8. **S405** : Tape-monitor selector switch in "**source**" position.
9. **S407** : Loudness switch in "**off**" position.
10. **S601** : Main speaker switch in "**off**" position.
11. **S602** : Remote speaker switch in "**on**" position.
12. **S701** : Power source switch in "**on**" position.
13. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    * Figures in [ ] stand for DC voltage in FM signal (no signal) mode.
    * Figures in < > stand for DC voltage in FM stereo signal reception mode.
    * Figures in ( ) stand for DC voltage in AM signal reception mode.
14. ▬▬ Positive (+B) voltage lines ▬▬ AF signal lines
    ▬▷ FM signal ▭▭▷ FM IF signal
    ▬▶ AM signal ▬▬▶ AM IF signal
    ▬▬▬ Negative (−B) voltage lines.
15. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety.
    When replacing any of these components use only manufacturer's specified parts.

NOTE

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.
At repairing and replacement, pay close attention to the diode (D912) for use as different diodes must be used depending on each rank of the ceramic filters.



RANK (Color)	D912	CENTER FREQUENCY
Red	X	10.70 MHz
Black	O	10.65 MHz

Note: O Mark Diode is used.
X Mark Diode is not used.

■ REPLACEMENT PARTS LIST

Notes:
1. Part number are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Ⓚ -marked parts are used for black only, while ○-marked parts are for silver type only.
4. Part other than Ⓚ -and ○-marked are used for both black and silver type.
5. The " **S** " mark is service standard•parts and may differ from production parts.
6. The circled numbers in the column of description stand for the quantity per set.

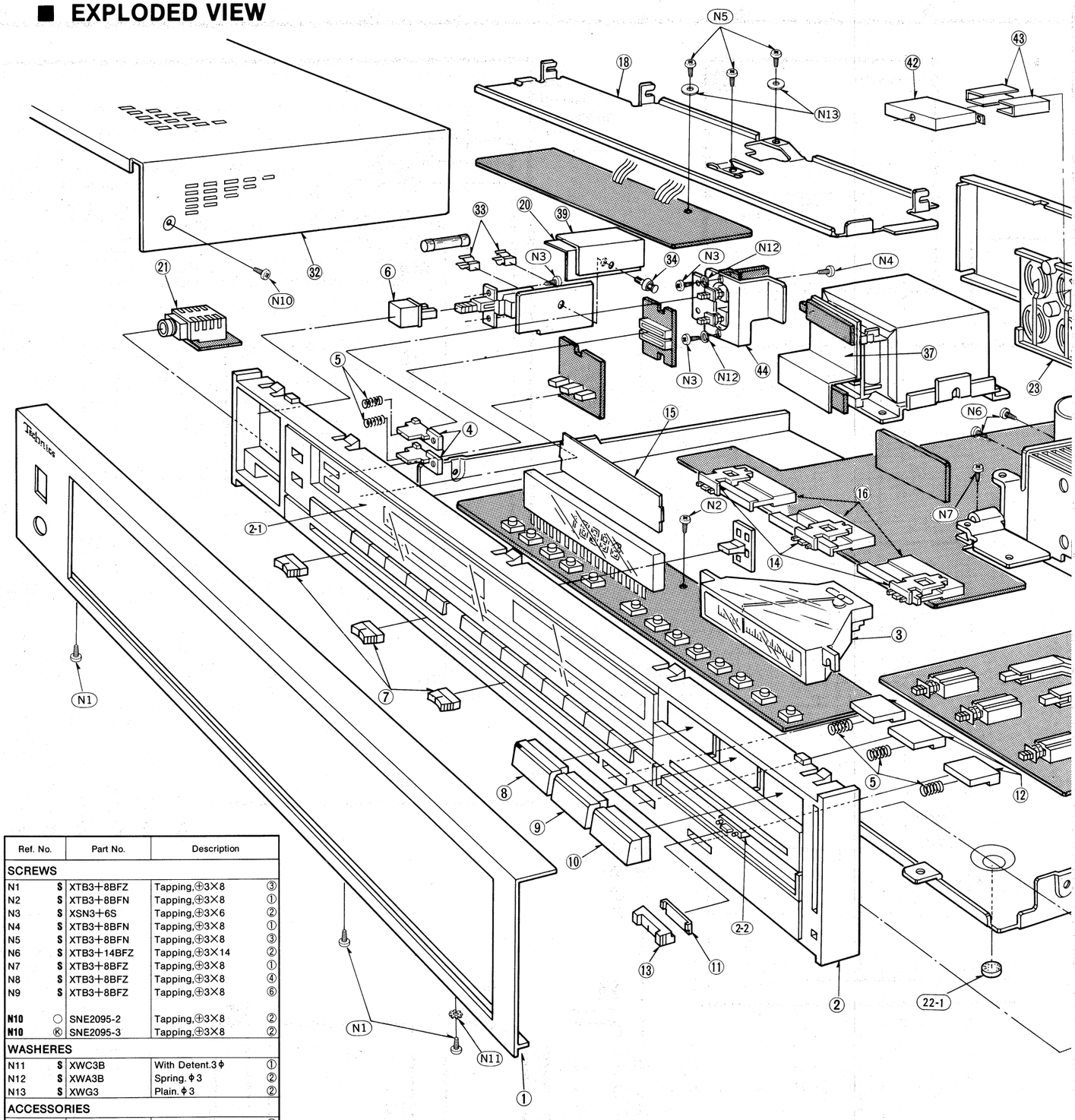
Ref. No.		Part No.	Description
INTEGRATED CIRCUITS			
IC1		AN6558F	Voltage Amplifier
IC71		AN7062	Voltage Amplifier
IC201		AN278	FM IF Amplifier
IC202		AN7273B	FM/AM IF Amplifier and FM/AM Det.
IC301		SVIUPC1161C3	Multiplex
IC601	⚠	SVISTK2038-2	2ch Power Amplifier
IC701		MN1421STA	ICQ Controller
IC901		SVID1704C525	PLL Controller
IC902		SVIUPB553AC	Pre Scaler
IC903		AN6873N	FL Driver
TRANSISTORS			
Q71,72		2SA1123-R	Voltage Amplifier
Q210,211	S	2SC1685-Q	Switching
Q212,213	S	2SA722-S	FM/AM Selector
Q214～216	S	2SC1685-Q	Switching
Q217	S	2SA722-S	Switching
Q601,602		2SC2631-R	ICQ Controller
Q603		2SC1685-Q	Switching
Q701		2SD1265-0	Regulator
Q702		2SC1685-Q	Regulator
Q703	S	2SC1383Q	Regulator
Q704～712	S	2SC1685-Q	Preheat Det, Power on/off Det. Over Load Det. Signal Det. Power Muting
Q713,714		2SA992	Over Load Det.
Q715～721	S	2SA722-S	ICQ Control
Q901,902	S	2SC945-Q	Loop Filter
Q903,904	S	2SC1685-Q	Analog Frequency
DIODES			
D71,72	S	MA162A	Derector
D201		SVDKV1236Z	AM Variable Capacitor
D206		MA27W-A	Detector
D207	S	MA162A	Switching
D208		LN846RP	LED.Quartz-Lock Ind (Red)
D301	S	MA162A	Switching
D401		LN224RP	LED.Volume (Red)
D601,602		SVDMC921	Synchronous Bias
D603,604		SVDMC911	Synchronous Bias
D605～608	S	20A90	Switching
D609～611	S	MA162A	Switching
D612	⚠	SVDSR1K2	Rectifier
D701～704	⚠	SVDS2V20	Rectifier
D705		MA1062M	6V,Zener
D706		MA1270M	27V.Zener
D707		MA1160L	16V.Zener
D710～714	S	MA162A	Rectifier
D716		LN0202GP6	LED.Auto Ind.
D717		LN0202YP4	LED.Praheat Ind.
D718～720		LN446YP	LED.High,Low and Thermal Ind.
D751	S	MA162A	Swiching
D901～911	S	MA162A	Swithing
D913	S	MA162A	Swiching
D914	S	MA162A	Swiching
D915		MA162A	Swiching
D917	S	MA1062M	6V,Zener
D918	S	MA162A	Swiching
COILS			
L81～84		ELQS181KB	Choke
L202		SLA2C5-P	Antenna
L203		SL02C29R-P	OSC
L290,291		SLQZ12G1-D	Choke
L301		SLM1C69-P	Choke
L302		SLMA1Z3-Z	Choke

Ref. No.		Part No.	Description
COILS			
L601,602		SLQY15G-30	Choke
L651～654		SLQY15G-10	Choke
L701		SLQX101-3M	Choke
L750,751		SLQX400-D	Choke
FUSE			
F1	⚠	XBA2C12TRO	250V,T1.2A
TRANSFORMERS			
T201		SLI4C535-Z	FM IF Off-Set
T202		SLI4C537-Z	Quartz Lock Ind.2kΩ(B)
T203		SLI2C143-M	AM IF
T701	⚠	SLT5N407-W	Power Source
VARIABLE RESISTORS			
VR201		EVN58AA00B23	Quartz Look, 2kΩ(B)
VR301		EVN75AA00B53	VCO Adj 5kΩ(B)
VR401		EWE00605A15S	Volume Control, 100kΩ(A)
VR501		EVD00305G15S	Balance Control, 100kΩ(G)
VR502,503		EWD00205C15S	Tone Control, 100kΩ(C)
VR601,602	S	EVNM4AA00B53	ICQ Adj 5kΩ(B)
VR701	S	EVNM4AA00B14	Micom Vco Adj,10kΩ(B)
VR901		EVN75AA00B53	Meter Adj, 5kΩ(B)
VARIABLE CAPACITOR			
CT201		SVCTY121B269	AM Antenna Trimmer
COMPONENT COMBINATIONS			
Z301,302		EXRP102K473T	180PF,47kΩ
Z901		EXBP87104M	100kΩ(×7)
Z902		EXFP7331MW	330PF(×7)
FLUORESCENT DISPLAY TUBE			
		SAD7MT29ZA	
FM FRONT END			
		SNVFE407G4S	Front End
THERMISTORS			
PS701		SRPBH47101	Posistor
PS702		SRPBD47101	Posistor
TH920		ERTD2FHL103S	10kΩ
CERAMIC FILTERS			
CF201		SVFE107MZ2-A	FM,10.7MHz (Red)
		SVFE107MZ2-D	FM,10.65MHz (Black)
CF202,203		SVFE107MM-A	FM,10.7MHz. (Red)
		SVFE107MM-D	FM,10.65MHz, (Black)
		(Use pair ranks as same as CF201 CF202 and CF203)	
CF204		SVFSFZ450F7L	AM,450kHz
SWITCHES			
S3～S15		SSG13	AM/FM Selector, Tuning Memory
S401～403		SSH3049	Input Selector
S17,405,407		SSH1031	FM Mode,Tape Monitor and Loudness
S701	⚠	SSH1071	Power Source
S601,602		SSH2047	Speakers
CRYSTAL			
X901		SVQ43U452-D	4.5MHz

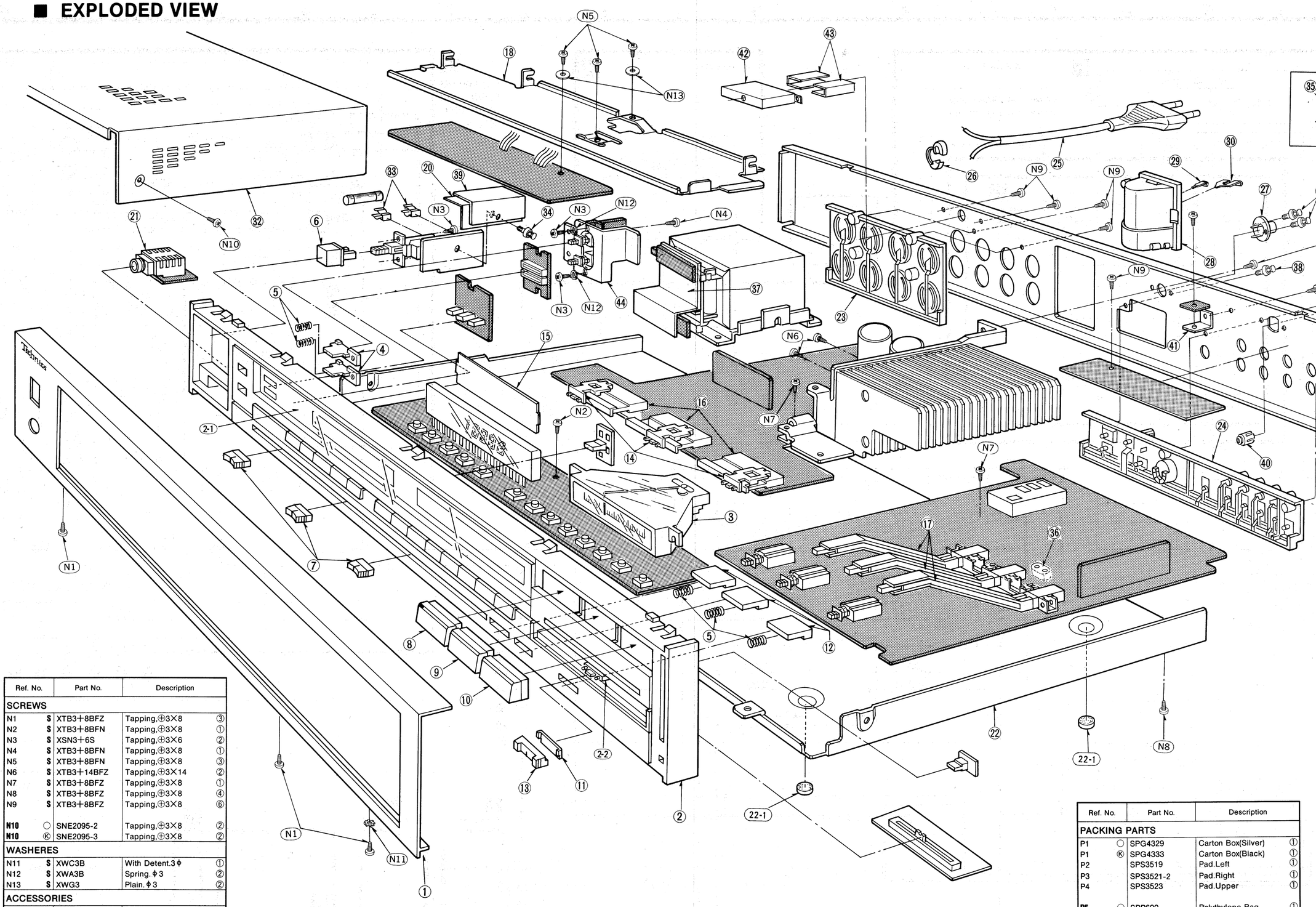
Ref. No.		Part No.	Description	
CABINET and CHASSIS PARTS				
1	○	SGWA310M	Front Panel Ass'y	①
1	Ⓚ	SGWA310KE	Front Panel Ass'y	①
2	○	SGXA310M	Sub Front Panel Ass'y	①
2	Ⓚ	SGXA310KE	Sub Front Panel Ass'y	①
2-1	○	SGU319SJ	Transparent Plate	①
2-1	Ⓚ	SGU319BB	Transparent Plate	①
2-2		SGX7431-1	Holder	①
3		SSM175-4	Meter	①
4	○	SBC483-2	Button,Speaker	②
4	Ⓚ	SBC483-4	Button,Speaker	②
5		SUS 257	Spring	⑤
6		SBC337-1M	Button,Power	①
7	○	SBD69-2M	Button,Bass,Treble Balance	③
7	Ⓚ	SBD69-1M	Button,Bass,Treble Balance	③
8		SBC549-7	Button,Selector (Aux,CD.Video)	①
9		SBC547-4	Button,Selector (Tuner)	①
10		SBC551-4	Button,Selector (Phono)	①
11		SHR9653	Spacer,Main Volume	①
12		SBC565-1M	Button,FM mode,Tape monitor Loudness	③
13	○	SBD71	Button,Main Volume	①
13	Ⓚ	SBD71-1	Button,Main Volume	①
14		SBZ663-1	Connection Rod.	③
15		SDU89-1	Sheet,FL	①
16	○	SGX7475	Holder	③
16	Ⓚ	SGX7475-1	Holder	③
17		SUB139-1	Connection Rod	③
18		SMC1041-1	Shield Cover	①
19		SJS9105	Socket,FM	(1)
20		SMX763	Cover,Fuse P.C.B	①
21		SJJ71B	Jack,Headphones	①
22		SKUA310G	Bottom Board (W/Feet)	①
22-1		SKL245-2	Foot	④
23		SJF4815-2	Terminal Board,Speaker	①
24		SJF8037-14N	Terminal Board,In Put	①
25		SJA138-3	AC Cord	①
26		SHR127	Bushing	①
27		SJFA3101-1	Terminal Board AM	(1)
28		SJB3005-1	Battery Case	①
29		SJC7	Terminal,Battery	②
30		SJC9	Terminal,Battery	②
31		SGP3510-12A	Rear Panel	①
32	○	SKCA410M	Cabinet Ass'y	①
32	Ⓚ	SKCA310KE	Cabinet Ass'y	①
33		SJT347	Crip,Fuse	②
34		SHR411	Pin	①
35		SHR301	Cramper,Read Wire	②
36		SHE101	Holder,P.C.B	①
37		SMX769	Insulation Sheet,	①
38		SHR401-1	Pin	③
39		SMX765	Insulation Sheet	①
40		RJP5	Connector	(1)
41		SUW1429	Bracket	(1)
42		SMC1015	Shield Cover	(1)
43		SMX681	Shield Cover	(2)
44		SMN1857	Bracket,Speaker	(1)

Ref. No.		Part No.	Description	
SCREWS				
N1	S	XTB3+8BFZ	Tapping,⊕3×8	③
N2	S	XTB3+8BFN	Tapping,⊕3×8	①
N3	S	XSN3+6S	Tapping,⊕3×6	②
N4	S	XTB3+8BFN	Tapping,⊕3×8	①
N5	S	XTB3+8BFN	Tapping,⊕3×8	③
N6	S	XTB3+14BFZ	Tapping,⊕3×14	②
N7	S	XTB3+8BFZ	Tapping,⊕3×8	①
N8	S	XTB3+8BFZ	Tapping,⊕3×8	④
N9	S	XTB3+8BFZ	Tapping,⊕3×8	⑥
N10	○	SNE2095-2	Tapping,⊕3×8	②
N10	Ⓚ	SNE2095-3	Tapping,⊕3×8	②
WASHERES				
N11	S	XWC3B	With Detent.3φ	①
N12	S	XWA3B	Spring. φ3	②
N13	S	XWG3	Plain. φ3	②
ACCESSORIES				
A1		SSA611-1	Loop Antenna (AM)	①
A2		SMA231	Holder	①
A3		SMA233-1	Holder	①
A4		XTN3+10AFZ	Screw	②
A8		SQF11787	Instruction Book	①

■ EXPLODED VIEW



■ EXPLODED VIEW



		Description	
S PARTS			
		Front Panel Ass'y	①
E		Front Panel Ass'y	①
		Sub Front Panel Ass'y	①
		Sub Front Panel Ass'y	①
		Transparent Plate	①
		Transparent Plate	①
		Holder	①
		Meter	①
		Button,Speaker	②
		Button,Speaker	②
		Spring	⑤
		Button,Power	①
		Button,Bass,Treble Balance	③
		Button,Bass,Treble Balance	③
		Button,Selector (Aux,CD.Video)	①
		Button,Selector (Tuner)	①
		Button,Selector (Phono)	①
		Spacer,Main Volume	①
		Button,FM mode,Tape monitor Loudness	③
		Button,Main Volume	①
		Button,Main Volume	①
		Connection Rod.	③
		Sheet,FL	①
		Holder	③
		Holder	③
		Connection Rod	③
		Shield Cover	①
		Socket,FM	(1)
		Cover,Fuse P.C.B	①
		Jack,Headphones	①
		Bottom Board (W/Feet)	①
		Foot	④
		Terminal Board,Speaker	①
N		Terminal Board,In Put	①
		AC Cord	①
		Bushing	①
		Terminal Board AM	(1)
		Battery Case	①
		Terminal,Battery	②
		Terminal,Battery	②
A		Rear Panel	①
		Cabinet Ass'y	①
		Cabinet Ass'y	①
		Crip,Fuse	②
		Pin	①
		Cramper,Read Wire	②
		Holder,P.C.B	①
		Insulation Sheet,	①
		Pin	③
		Insulation Sheet	①
		Connector	(1)
		Bracket	(1)
		Shield Cover	(1)
		Shield Cover	(2)
		Bracket,Speaker	(1)

Ref. No.		Part No.	Description	
SCREWS				
N1	$	XTB3+8BFZ	Tapping,⊕3×8	③
N2	$	XTB3+8BFN	Tapping,⊕3×8	①
N3	$	XSN3+6S	Tapping,⊕3×6	②
N4	$	XTB3+8BFN	Tapping,⊕3×8	①
N5	$	XTB3+8BFN	Tapping,⊕3×8	③
N6	$	XTB3+14BFZ	Tapping,⊕3×14	②
N7	$	XTB3+8BFZ	Tapping,⊕3×8	①
N8	$	XTB3+8BFZ	Tapping,⊕3×8	④
N9	$	XTB3+8BFZ	Tapping,⊕3×8	⑥
N10	○	SNE2095-2	Tapping,⊕3×8	②
N10	Ⓚ	SNE2095-3	Tapping,⊕3×8	②
WASHERES				
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N12	$	XWA3B	Spring.φ3	②
N13	$	XWG3	Plain.φ3	②
ACCESSORIES				
A1		SSA611-1	Loop Antenna (AM)	①
A2		SMA231	Holder	①
A3		SMA233-1	Holder	①
A4		XTN3+10AFZ	Screw	②
A8		SQF11787	Instruction Book	①

Ref. No.		Part No.	Description	
PACKING PARTS				
P1	○	SPG4329	Carton Box(Silver)	①
P1	Ⓚ	SPG4333	Carton Box(Black)	①
P2		SPS3519	Pad.Left	①
P3		SPS3521-2	Pad.Right	①
P4		SPS3523	Pad.Upper	①
P5	○	SPP699	Polythylene Bag	①
P5	Ⓚ	SPP649	Polythylene Bag	①

Printed in Japan
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ORDER NO. HAD8709293S2

Service Manual

Receiver

Supplement

QUARTZ Synthesizer
MW/LW/FM Stereo Receiver

SA-R310L

Color

(K).....Black Type

Area

Color	Area
(K)	(EW) .....Switzerland.
(K)	(EF) .....France.
(K)	(EB) .....Belgium.
(K)	(EK) .....United Kingdom.

Please file and use this supplement manual together with the service manual for Model No. SA-R310L, Order No. HAD8706181A2.

Note:

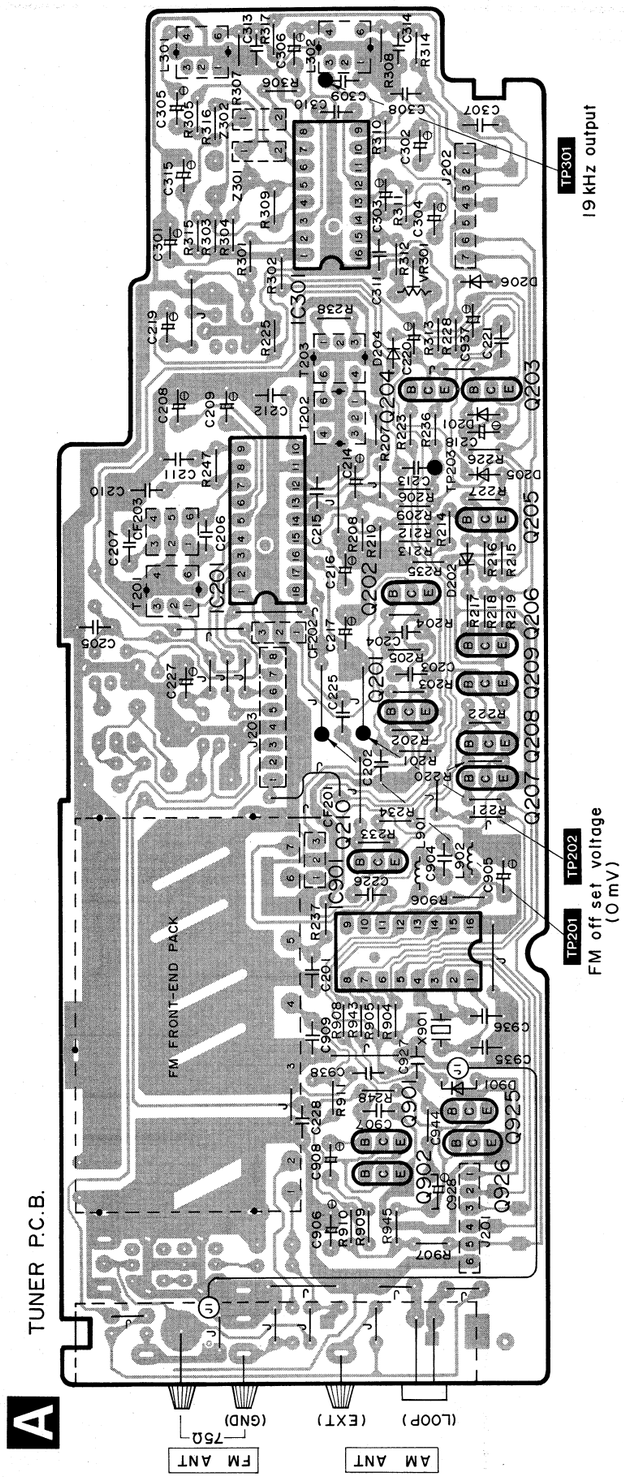
This supplement has been issued to inform you that the tuner P.C.B. has been changed during production.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ PRINTED CIRCUIT BOARD

A TUNER P.C.B.



■ SCHEMATIC DIAGRAM

A TUNER CIRCUIT

FM FRONT-END PACK SNVFE306E15

FM signal

FM ANT 75Ω

(GND)

EXT

AM ANT

LOOP

MW/LW signal

Q901,902,925,926
2SC2785
FM/MW/LW
LOOP FILTER

Q201,202
2SC2787
FM IF AMP

Q203
2SC1740
SWITCHING

Q204
2SC1740
FM/MW/LW
SELECTOR

Q210
2SC1740
MW/LW OSC
BUFFER

MW/LW OSC signal

IC201
AN7273A
FM/AM IFAMP, DET &
AM MIXER

IC901
LM7001
PLL FREQUENCY
SYNTHESIZER

FM off set
voltage(0mV)

AF signal

IC301
AN7470
FM MULTIPLEX

19kHz
output

Q205
2SC1740
SIGNAL DET.

Q206
2SA933
SIGNAL DET

Q207
2SC1740
POWER SUPPLY (FM/MW/LW)

Q208,209
2SA933
POWER SUPPLY (FM/MW/LW)

J202
L ch
R ch
E
ST
Mono
SD
Mut

J201
+15V
SO
CK
CE
+5V

J203

MW OSC coil

MW ANT coil

MW ANT trimmer

LW OSC coil

LW ANT coil

LW ANT trimmer

Q211
2SA933
MW/LW SWITCHING

Q212~214
2SC1740
MW/LW SWITCHING

Printed in Japan
K870900500AM